ARCADIS Orbic

English

Operator Manual

SPR2-320.620.01.02.02

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Operator Manual
ARCADIS Orbic

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ARCADIS Orbic

Safety

SP

SPR2-320.620.01.02.02

Please observe the

Safety register

This must be studied thoroughly before system startup.

The original version of this manual was written in the German language.

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Operator Manual
Safety

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Information about this Operator Manual

Proper use of this equipment presupposes that the operating personnel are familiar with the Operator Manual. This manual must be studied in detail prior to starting up the system. Special attention must be given to the following sections:

- ❏ Safety information
- ❏ Functional and safety checks
- ❏ Personal safety
- ❏ Equipment safety

The operating personnel must be instructed in the proper operation of the equipment. Training must be repeated as required at appropriate intervals.
We recommend simulating emergency conditions during training so that appropriate corrective measures can be taught.

Warnings

Warning Warning is used to indicate the presence of a hazard which can cause personal injury or death.

Warning

At first the source of danger is stated.

Then possible consequences are pointed out.

- ◆ In conclusion you receive information on how to rule out any danger.

Caution Caution is used to indicate the presence of a hazard which can cause damage to the equipment if this is used improperly.

Caution

At first the source of danger is stated.

Then possible consequences are pointed out.

- ◆ In conclusion you receive information on how to rule out any danger.

General information

Note Note is used to notify users of operator information which is important but not hazard-related.

Notes are marked with an exclamation mark "!" and printed in italics.

Information about correcting errors

Information on how to solve problems that might occur when performing operating steps, is given at the end of the respective instructions.

In these paragraphs, the problem and the potential cause are described.

To solve the problem, perform the operating steps specified here.

Names and parameters

All names and data of patients and institutions that are used in this Operator Manual are entirely fictional.

Any resemblance to names of existing people or institutions past or present is entirely coincidental.

All parameters and images shown in this manual are examples. Only the parameters displayed by your system are definite.

Laws and regulations

If legally binding regulations govern the installation and/or operation of the system, it is the responsibility of the installer and/or the operator to observe these regulations.

In all countries, the legally established regulations are to be observed. Deviating from this Operator Manual, values may be set according to country-specific regulations.

This product is provided with a CE marking in accordance with the provisions of Directive 93/42/EEC of June 14th, 1993 concerning medical devices.

Data related to individual persons is subject to data protection. Ensure compliance with all applicable laws and regulations.

Legally required tests must be performed at the specified intervals. These tests include, for example

- ❏ Constancy test according to the X-ray ordinance (§16 RöV) in the Federal Republic of Germany.
- ❏ Tests based on DHHS guidelines (Department of Health and Human Services) where applicable.

Validity

This Operator Manual applies to the following product:

- ❏ ARCADIS Orbic

Software

The system and user software used in this product is protected by copyright.

Warning

Use of unreleased software or manipulations/modifications to released software can lead to system malfunctions.

This can result in injury to the patient and/or damage to the equipment.

- Only software released by Siemens for use with this product may be used.

Caution

Impermissible or faulty manipulations/modifications to the software or to the connection between the ARCADIS Orbic system and the power supply can lead to malfunctioning of the system.

Unauthorized access

- Make sure all necessary precautions are taken (with the existing level of security) when changing a functionality or factory-set configuration.

Caution

Reduced system performance due to overload of the network environment.

Unexpected system behavior

- Only use the system in a secure and load-adapted network.

Equipotential bonding

Products for which equipotential bonding is required may only be operated in medical facilities where supplementary equipotential bonding has been installed and tested according to DIN VDE 0107 or the relevant country-specific regulations.

Electromagnetic compatibility

This medical device complies with the requirements of the applicable standard on electromagnetic compatibility (EMC).
(→ see Operator Manual "Information on electromagnetic compatibility")

However, we wish to inform you that other mobile electronic devices such as radio telephones (mobile phones) exceed the radiation limits specified in the EMC standard and can therefore disturb functions of your medical device.

Use in connection with high frequency

The following regulations for use must be observed:

- ❏ IEC/TR 1289-1/07.94/
  High frequency surgical equipment - Part 1: Operation

- ❏ IEC/TR 1289-2/08.94/
  High frequency surgical equipment - Part 2: Maintenance

Maintenance and check

Before using the equipment for examination, the user must ascertain that all safety-relevant devices function properly and that the system is ready for operation.

Wear and tear

The system is subject to mechanical and electrical wear and tear. In the interest of the safety of patients, operating personnel and third persons, maintenance and safety checks must be carried out every 12 months to maintain the operational safety and reliability of the product.

Please observe the relevant information in the (→ Register Maintenance).

Caution

Improper use and excessive load on the system can lead to mechanical damage and damage to the system electrics.

Injury to operating personnel, patients or third persons and damage to the product.

- If necessary, have the system checked more frequently.
- Ensure that any defects are repaired professionally.

Image quality

Maintenance should include checking the image quality. Maintenance at regular intervals is recommended to always ensure best image quality.

To ensure optimal image quality, have the following functions checked in particular as part of regular maintenance:

Pixel shift, image rotation, noise reduction, edge enhancement, subtraction, Roadmapping.

Performing maintenance

Maintenance work should be performed by trained technical personnel only. If you do not have a maintenance contract, please contact Siemens Customer Service.

If national laws or regulations specify more frequent checking and/or maintenance, this must be observed.

Malfunctions

In the event of system malfunctions, call SIEMENS Customer Service.

Error messages at the C-arm system

When a malfunction is detected, the ARCADIS Orbic system is disabled and an error is displayed on the control panel of the C-arm system:

In addition, a malfunction is also displayed on the left monitor:

- ❏ All vital system functions are automatically checked each time the ARCADIS Orbic is switched on.
- ❏ During routine operation, the ARCADIS Orbic is continuously monitored.
- ❏ Temporary error messages, such as No. 5901, can be cancelled by pressing any button on the ARCADIS Orbic (except lifting column and On/Off button).
- ❏ Non-temporary error messages, such as No. 5015 or 5016, cannot be cancelled. If these errors occur, radiation release is no longer possible. Please notify Customer Service immediately.

The error messages 7309 and 7409 are temporary error messages that can lead to unnecessary radiation exposure of the user and patient if treatment is continued.

If errors occur repeatedly, switch off the ARCADIS Orbic and notify Customer Service. Have the following information ready:

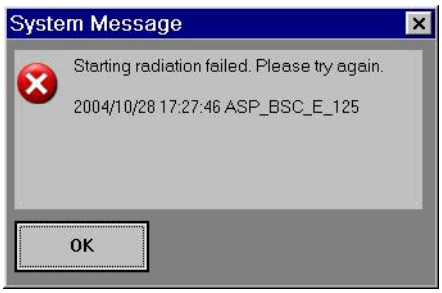
- ❏ Error number
- ❏ Operating mode selected
- ❏ Was radiation activated when the error occurred?
- ❏ Is the error related to an operating process?

In case of a malfunction or failure of the radiation indicator, please notify Siemens Customer Service.

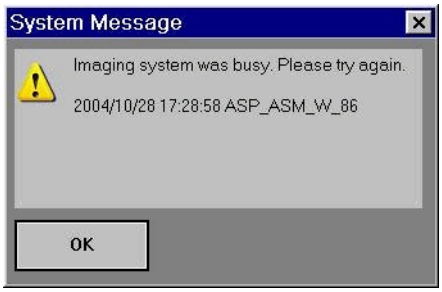
System messages on the monitor

Three different types of system messages can appear on the monitor. The type of message is identified by a corresponding symbol (top left).

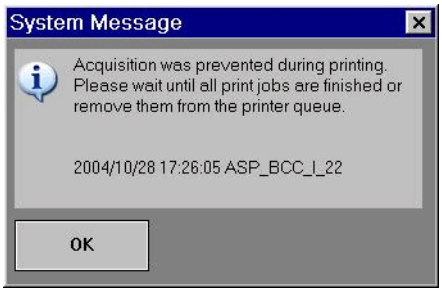
❏ Example of an error message:



❏ Example of a warning:



❏ Example of information:


System Message
Acquisition was prevented during printing.
Please wait until all print jobs are finished or
remove them from the printer queue.
2004/10/28 17:26:05 ASP_BCC_I_22
OK

You must confirm error messages with the **OK** button or the radiation release button to be able to resume your work. However, warnings and information do not disable radiation release.

Malfunction of electrics

In case of danger for patients and operating personnel (e.g. if there is no live image on the monitor and the radiation indicator is on despite this) or danger for the product, you must disconnect the power plug immediately. The ARCADIS Orbic is shut down completely and disconnected from the power supply. This will

- ❏ switch off radiation
- ❏ abort the current system program
- ❏ abort and cancel current operating sequences
- ❏ delete all image information not saved to a hard disk.

Only after the cause of the hazard has been clearly identified and remedied may the system be reconnected to the power supply. In all other cases, e.g. system malfunction, contact Siemens Customer Service immediately.

Switching to emergency power supply

If a power interruption lasts longer than 8 ms, the ARCADIS Orbic can switch off. In this case the ARCADIS Orbic must be switched on again after switching to the emergency power supply.

In case of a power failure, a signal sounds (up to 10 min.) when the system switches to the uninterruptible power supply (UPS).

Disconnecting the power plug

After disconnecting the power plug, voltage is supplied to the imaging system and the left monitor by the uninterruptible power supply (UPS) until the ARCADIS Orbic switches off completely.

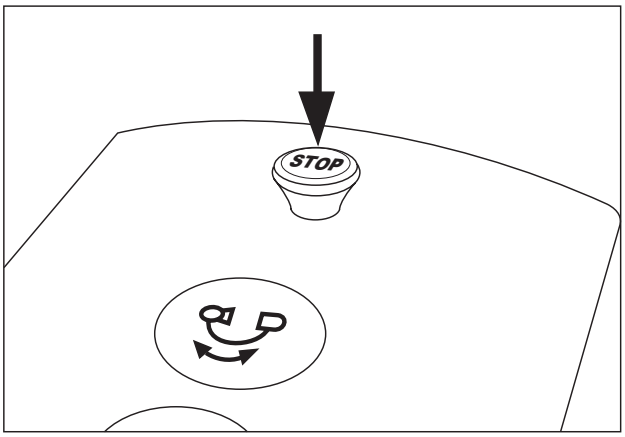
When the power plug is pulled out, switching to the uninterruptible power supply causes an acoustic signal to be emitted. The UPS switches off after 10 min. at the latest.

As soon as the mains supply is restored, the battery of the UPS is recharged.

Please remember that the UPS battery life is limited.

Emergency STOP

Please immediately press the EMERGENCY STOP button (arrow) on the electronics unit of the C-arm system when a dangerous situation results from motorized movements.



- ❏ Motorized vertical movement is then immediately disabled.
- ❏ With the 3D option, automatic travel of the C-arm is stopped immediately.
- ❏ All other system functions remain unaffected by this.

Unlock the button only after the danger has clearly been eliminated.

- ❏ The button can be unlocked by gently turning it clockwise.

Fire protection

Warning

In the event of fire

A fire or smoldering fire can produce toxic gases or fumes.

- Immediately switch off the ARCADIS Orbic.
- Pull the power cable out of the wall outlet.
- Inform all personnel of the correct procedures in case of fire as part of occupational safety training.

Please inform our Customer Service prior to starting up the ARCADIS Orbic again as it may require refurbishing due to damage caused by fire.

Explosion protection

Warning

Ignitable concentration of anesthetic gases in the examination room.

Explosion hazard!

- The ARCADIS Orbic must not be operated in such an environment.

Overload protection

Prolonged continuous radiation at maximum tube load is permissible during fluoroscopy. However, this can cause the X-ray tube assembly to heat up. For this reason, the X-ray tube assembly has a thermal monitor. If necessary, power is reduced in all operating modes, in SUB/Roadmap with the next new scene/mask.

Caution

Heating up of the X-ray tube assembly due to continuous radiation

Burns of the skin may occur.

The tube assembly housing must not come into contact with the patient's skin at a temperature of ≥ 50 °C.

If the temperature rises to ≥ 50 °C,

❏ the temperature indicator on the control panel of the C-arm system lights up

❏ the selected characteristic curve is switched to S1 at the end of radiation in FLUORO and pulsed FLUORO.

If the temperature rises to ≥ 60 °C,

❏ the selected characteristic curve is switched to S1 during radiation in FLUORO and pulsed FLUORO.

If the temperature rises to ≥ 70 °C,

❏ the temperature indicator on the control console of the C-arm system flashes

❏ radiation is aborted and cannot be released again.

If the temperature drops back below 50 °C,

❏ the previously deselected characteristic curve is automatically reselected.

Open heart and skull examinations

If an approved system is used alone or with other equipment for cardiac or cranial examinations, a conductive connection must be made between the system and a potential equalization point, e.g. the tabletop.
(→ Register System Description, Page 10)

Only then can the patient be connected to the system.

Crushing hazards on the C-arm system

Correct handling of the C-arm system requires that operating personnel and patients use only the grips provided for this purpose. Where this is not possible, monitor the points of potential crush injury between movable system parts and their guide openings.

Warning

Moving and braking the C-arm (see Fig. 1 and 3)

Risk of crushing hands.

- Please make sure that your hands are not in the travel path of system parts.

Warning

Maximum lowering of the C-arm (see Fig. 2)

Risk of crushing feet.

- Please watch your feet when the C-arm is being lowered fully, since there may not be sufficient clearance left between the I.I. and the floor.

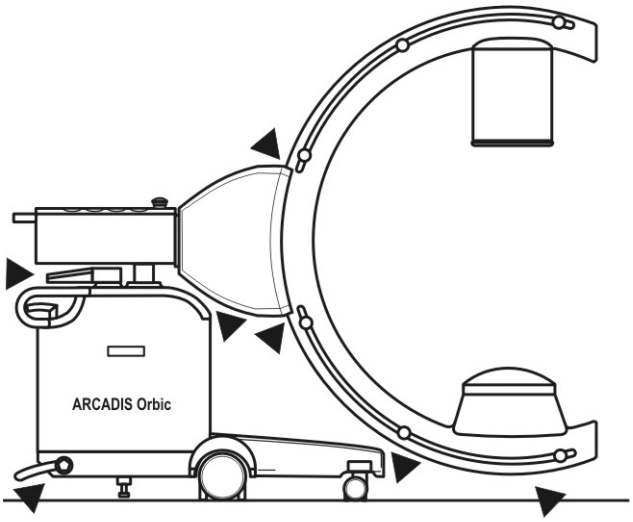
Warning

Maximum lowering of the C-arm (see figure)

Radiation can be released inadvertently.

- Please make sure that the footswitch is not located underneath the C-arm.

The system areas marked in the drawing indicate points of crushing or impact hazards for the patient or operating personnel.



Potential danger points when moving, braking or fully lowering the C-arm

Crushing hazard on the monitor trolley

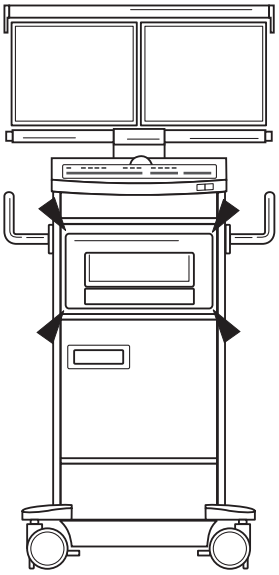
Your monitor trolley can optionally be equipped with a printer.

Caution

Moving the printer out or in

Risk of crushing hands.

- Mind your hands when moving the printer out of or into its location.



Mechanical damage

To avoid injury to the patient, operating personnel or third parties, mechanical damage to the system must be repaired by authorized service personnel.

Radiation protection

Automatic dose rate control contributes considerably to the reduction of radiation exposure of the patient and operator.

Nevertheless, observe the following important notes in order to keep the dose absorbed by the patient as low as possible.

For the patient

- ❏ Keep the radiation field as small as possible.
- ❏ Provide the best possible protection for reproductive organs (gonadal shield or lead-rubber cover) when taking exposures in the vicinity of these organs.

For the operating personnel

- ❏ When releasing the exposure, the operator must keep a sufficient safety distance from the X-ray tube assembly.
- ❏ Wear protective clothing in the control area during an examination.
- ❏ Wear a radiation-monitoring badge or use a pen dosimeter.

For patients and operating personnel

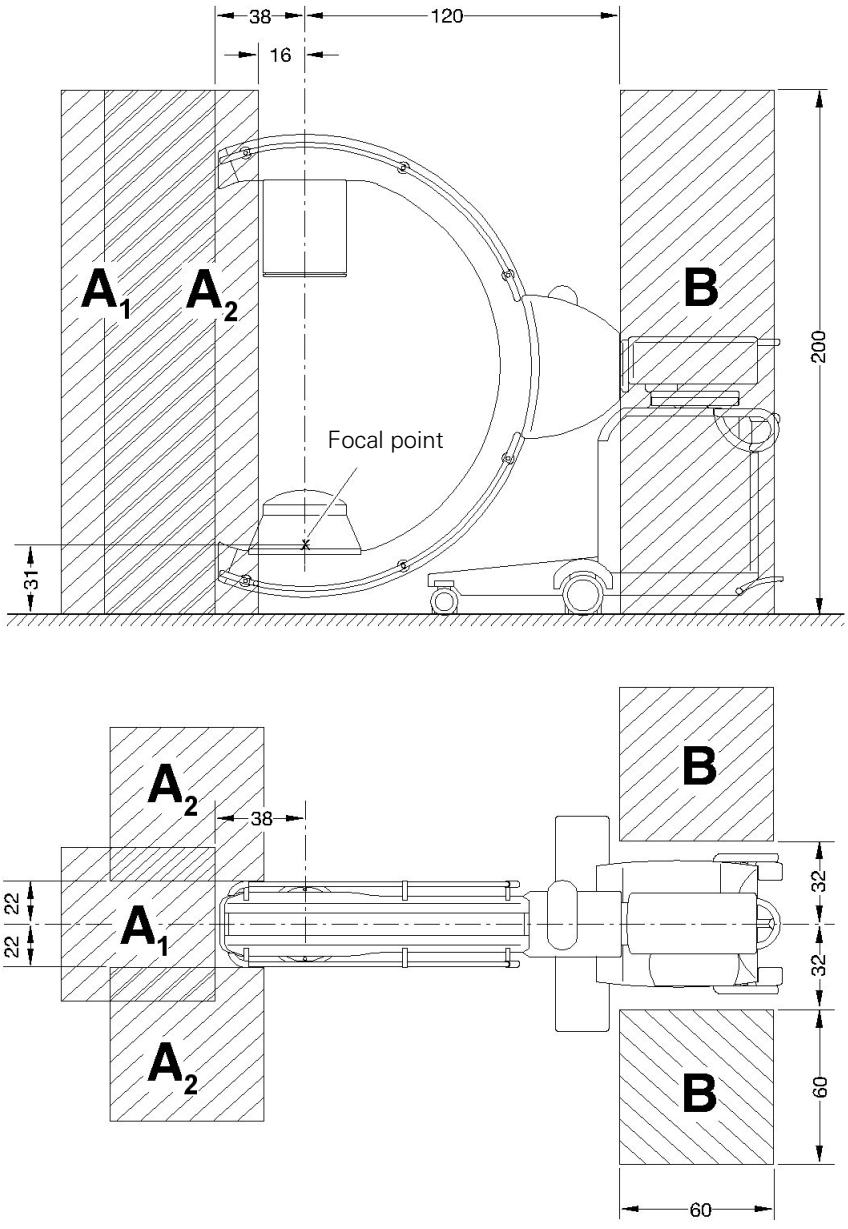
- ❏ Keep the fluoroscopic time as short as possible.
- ❏ Maintain the maximum possible source-skin distance.

Additional objects in the beam path may result in increased scattered radiation.

Please be aware that certain materials in the X-ray beam (e.g. parts of an operating table) may deteriorate the X-ray image due to imaging of contours and inclusions in these materials. In rare cases this can result in incorrect diagnosis. This material may also result in a higher radiation exposure.

Location and size of the relevant operating area

C-arm vertical, image intensifier at the top



Relevant operating area
Dimensions in cm

Scatter radiation in the main operating area according to EN 60601-1-3

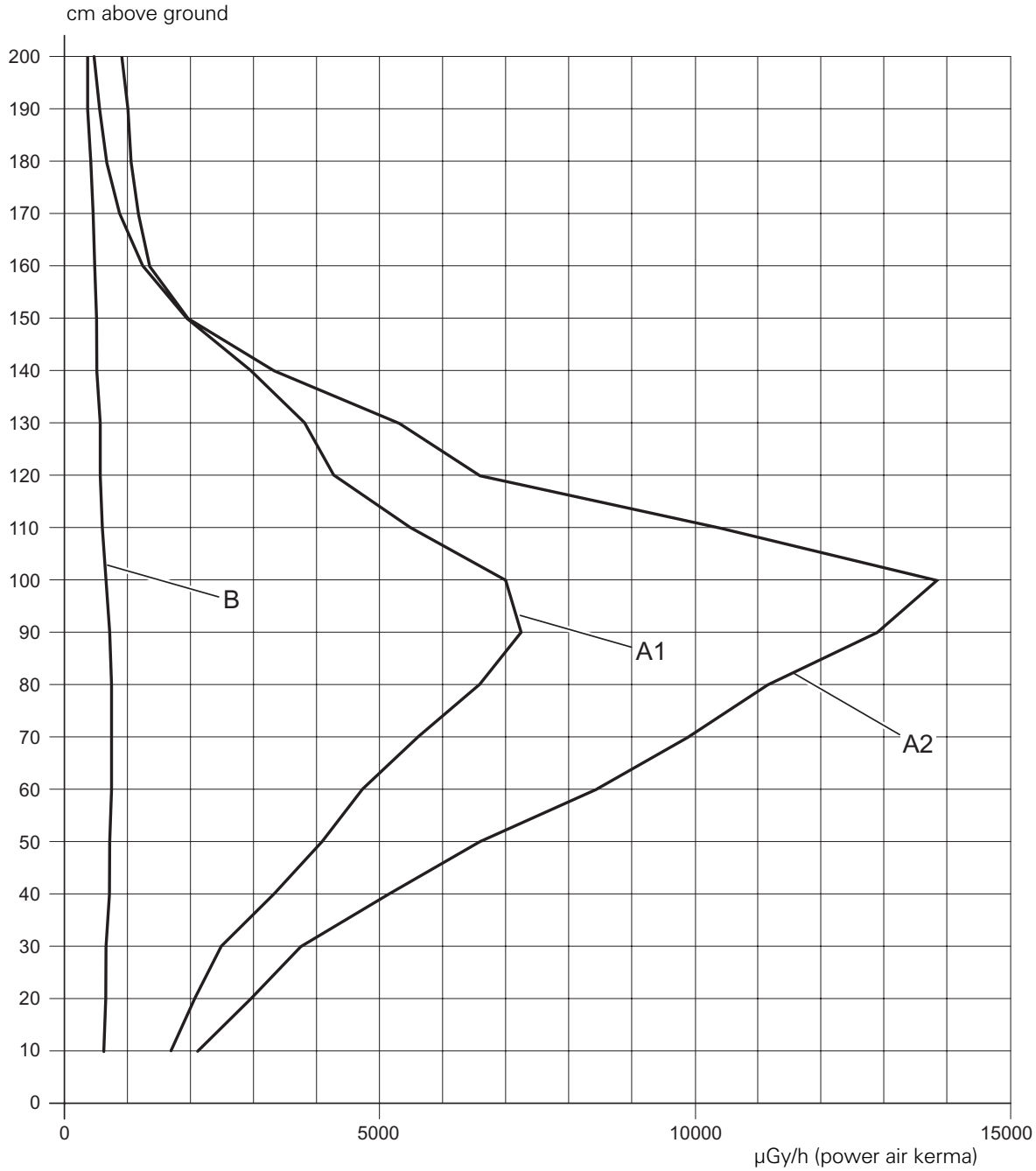
Beam direction vertically upwards

Height above floor in cm	Measurement A1 µGy/h	Measurement A2 µGy/h	Measurement B µGy/h
10	1685	2088	612
20	2052	2916	648
30	2473	3708	648
40	3294	5112	684
50	4050	6552	684
60	4698	8388	720
70	5573	9828	720
80	6545	11124	720
90	7214	12852	684
100	7009	13824	648
110	5497	10404	576
120	4266	6588	540
130	3834	5328	540
140	2970	3348	504
150	1955	1944	504
160	1253	1332	468
170	875	1152	432
180	680	1044	396
190	544	972	360
200	475	900	360

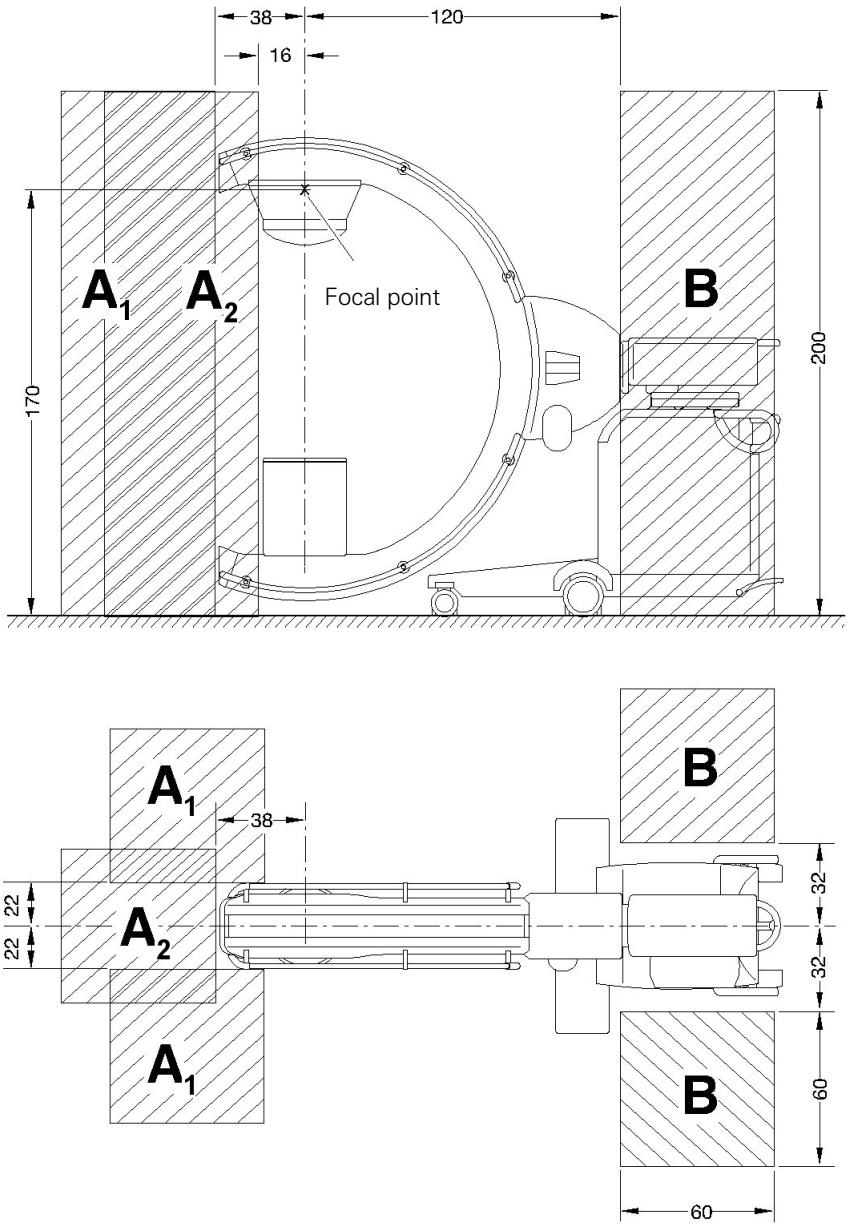
Measurement A1: (operating area A1)
continuous fluoroscopy 110 kV, 3.0 mA

Measurement A2: (operating area A2)
continuous fluoroscopy 110 kV, 3.0 mA

Measurement B: (operating area B)
continuous fluoroscopy 110 kV, 3.0 mA


cm above ground
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0
5000
10000
15000
µGy/h (power air kerma)
B
A1
A2

C-arm vertical, image intensifier at the bottom



Relevant operating area
Dimensions in cm

Scatter radiation in the main operating area according to EN 60601-1-3

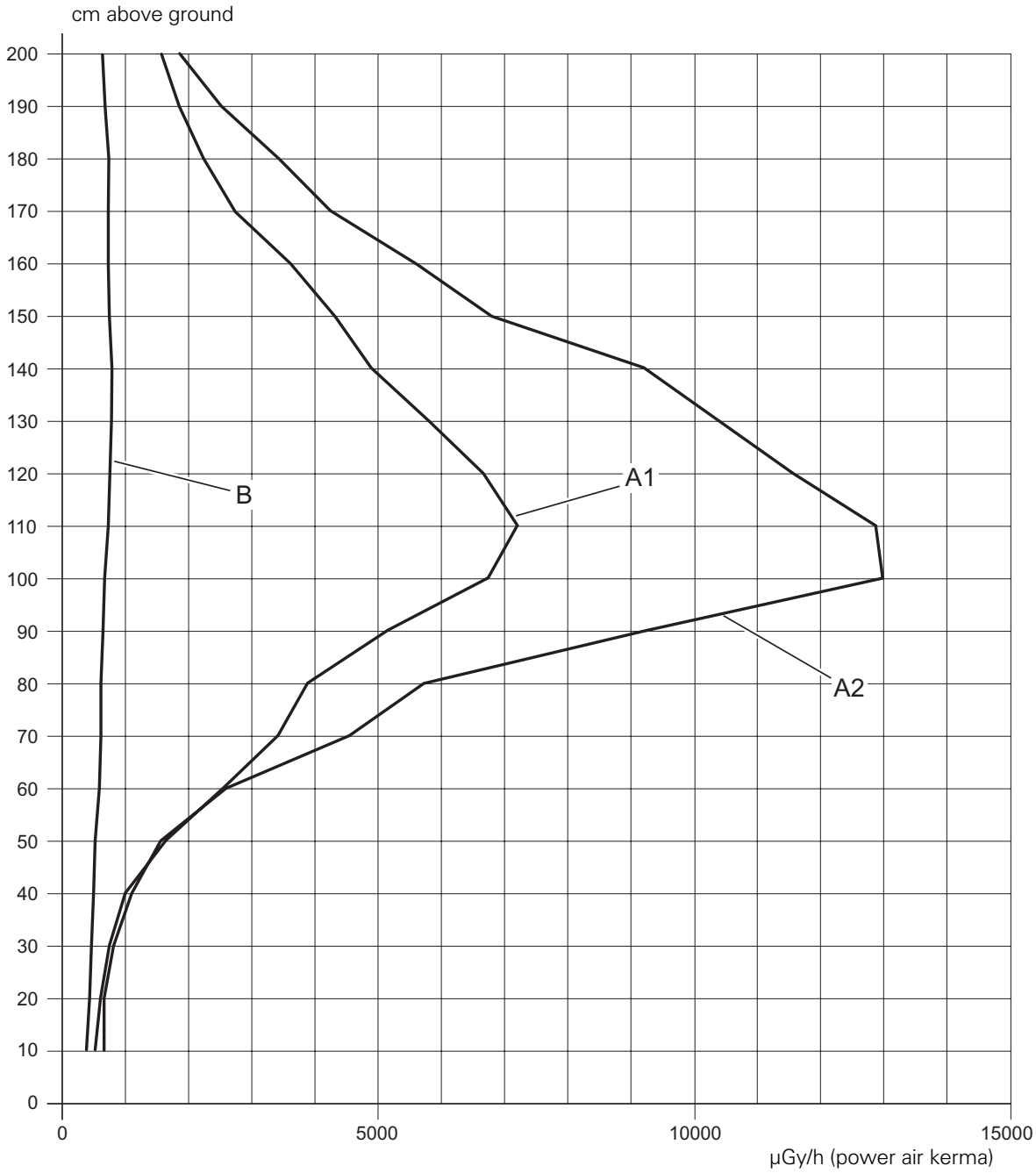
Beam direction vertically downward

Height above floor in cm	Measurement A1 µGy/h	Measurement A2 µGy/h	Measurement B µGy/h
10	486	648	360
20	594	648	396
30	734	792	432
40	994	1080	468
50	1631	1548	504
60	2527	2556	540
70	3395	4500	576
80	3852	5688	576
90	5108	9180	612
100	6700	12996	648
110	7160	12816	684
120	6628	11520	720
130	5764	10368	756
140	4849	9180	756
150	4306	6768	720
160	3604	5580	684
170	2700	4212	684
180	2203	3384	684
190	1840	2484	648
200	1541	1836	612

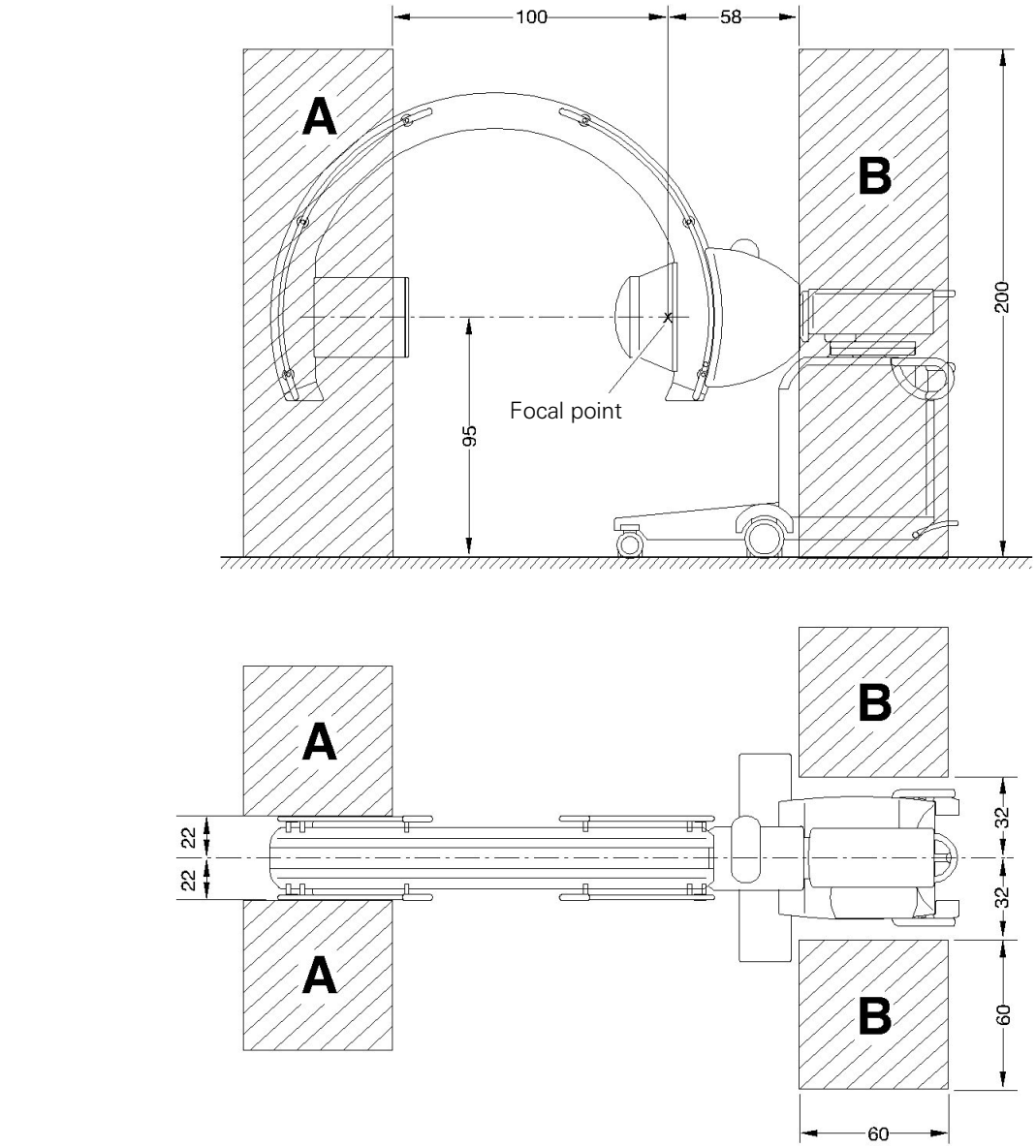
Measurement A1: (operating area A1)
continuous fluoroscopy 110 kV, 3.0 mA

Measurement A2: (operating area A2)
continuous fluoroscopy 110 kV, 3.0 mA

Measurement B: (operating area B)
continuous fluoroscopy 110 kV, 3.0 mA


cm above ground
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0
5000
10000
15000
µGy/h (power air kerma)
B
A1
A2

C-arm horizontal, image intensifier outside



Relevant operating area
Dimensions in cm

Scatter radiation in the main operating area according to EN 60601-1-3

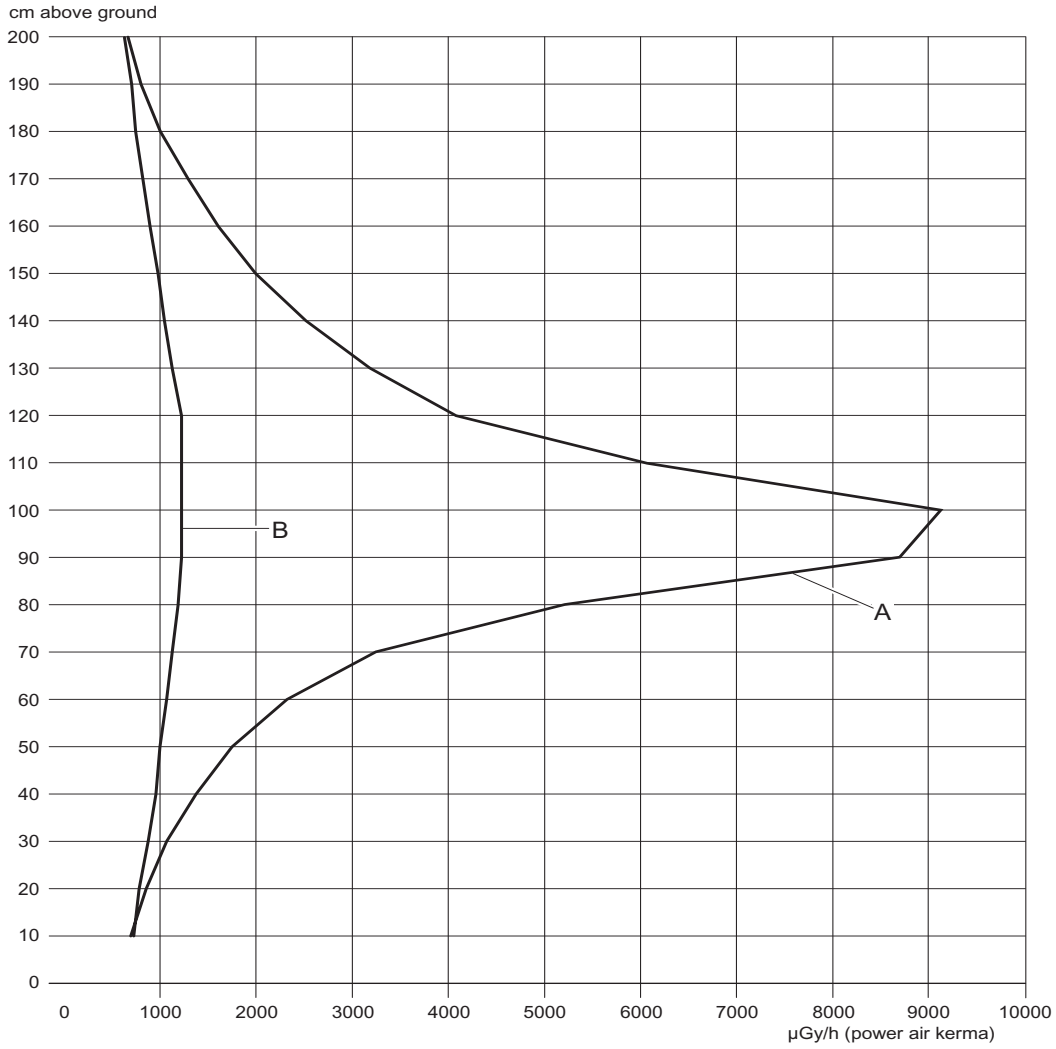
Beam direction horizontal, X-ray tube near control console

Height above floor in cm	Measurement A µGy/h	Measurement B µGy/h
10	680	702
20	842	767
30	1048	853
40	1350	929
50	1739	972
60	2322	1058
70	3229	1112
80	5227	1166
90	8676	1199
100	9126	1210
110	6048	1206
120	4072	1202
130	3175	1112
140	2506	1026
150	1987	950
160	1588	875
170	1274	810
180	990	734
190	778	680
200	659	616

Measurement A: (operating area A)
continuous fluoroscopy 110 kV, 3.0 mA

Measurement B: (operating area B)
continuous fluoroscopy 110 kV, 3.0 mA

cm above ground



µGy/h (power air kerma)

Maximum scatter radiation in the operating area

Measuring conditions

The values are valid for continuous fluoroscopy 110 kV, 3.0 mA, water phantom 25 x 25 x 15 cm in the center of the central beam on the image intensifier.

C-arm vertical, image intensifier at the top

Height above floor	Area	Value in mGy/h
90 cm	A 1	≤ 7.22
100 cm	A 2	≤ 13.9
60 - 70 cm	B	≤ 0.72

C-arm vertical, image intensifier at the bottom

Height above floor	Area	Value in mGy/h
110 cm	A 1	≤ 7.16
110 cm	A 2	≤ 12.82
130 - 140 cm	B	≤ 0.76

C-arm horizontal, image intensifier outside

Height above floor	Area	Value in mGy/h
100 cm	A	≤ 9.13
100 cm	B	≤ 1.21

Radiation interruption for all operating modes

The hand switch as well as the footswitch are designed as push buttons.
By releasing the respective operating element, radiation during fluoroscopy is interrupted immediately, or on completion of the storage image.

Positioning the C-arm

The maneuverability of the C-arm may cause the image intensifier or single tank to collide with the patient or the patient table when the ARCADIS Orbic is not operated as specified.

For unfavorable positioning of the unit, collision can also take place between the image intensifier/single tank and the unit base. This can cause damage to the components affected.

Brakes Make sure the brakes are applied after adjusting the C-arm position.

Transport When moving or transporting the C-arm system please take special care that the system parts do not collide with an obstacle. This could also result in accidental radiation release or an impairment of image quality under certain circumstances.

Installation, repair

Modifications or upgrades to the product must comply with legal regulations as well as generally accepted engineering standards.

As manufacturer, SIEMENS will not be held responsible for the safety features, reliability and performance of the product if:

- ❏ the product is used in a manner other than that specified in the Operator Manual
- ❏ installation, upgrades, resetting, modifications or repairs are performed by personnel not authorized by Siemens
- ❏ components affecting product safety are not replaced with original spare parts
- ❏ the electrical wiring in the rooms containing the system does not met the specifications of DIN VDE 0107 or the corresponding local regulations

If desired, we will provide the technical documentation for the product. However, this does not imply authorization to undertake repairs.

We cannot be held responsible for repairs made without our express written approval.

When any work is performed on the product, we would recommend that you obtain a certificate indicating the nature and scope of the work performed. The certificate should include any changes in rated parameters or operating ranges as well as the date, the name of the company and a signature.

Original accessories

For safety reasons, only approved original accessories from Siemens or accessories from other manufacturers approved by Siemens AG, Medical Solutions Group, may be used for this product.

The operator is liable for any risks associated with the use of accessories not approved by Siemens.

Combination with other products/ components

To ensure the required safety, only products/components expressly approved by SIEMENS AG, Medical Solutions Group, may be used in combination with this system.

Regarding the attachment of non-Siemens products to the image intensifier please refer to (→ Page 31).

Additional components that are brought into the beam path (e.g. positioning aids) will attenuate radiation and can degrade image quality.

Attachment of dedicated options

The attachment of certain (dedicated) options is permitted only if the following conditions are complied with:

General safety requirements

The use of accessories that do not comply with the relevant safety requirements of this system can result in a reduced safety level of the combined system.

When choosing accessories, the following aspects must be considered in particular:

- ❏ Use of accessories close to the patient.
- ❏ Proof that the accessories have been safety tested according to the applicable IEC 60601-1 guideline and/or the IEC 60601-1-1 harmonized national standard.

Tilting resistance; mechanical strength; central ray migration

To comply with the tilting resistance, mechanical strength and central ray migration standards (IEC60601-1, IEC60601-2-32, UL2601, 4 times load, IEC 60601-1-3), the additional weight attached to the image intensifier must not exceed 4.5 kg (10 lb).

If these conditions are not fulfilled, the function may be impaired.

Attachment

When a dedicated option is used on the image intensifier, it must be ensured that there is no danger due to insufficient or incorrect attachment.

Attenuation equivalent

According to IEC 60601-1-3, inadequate attenuation of the X-ray beam by materials between the patient and image receptor (here: I.I.) must be avoided.

Documented proof by the manufacturer is recommended.

Auxiliary devices located in the beam path for calibration/adjustment of the dedicated options must be removed before operating the ARCADIS Orbic.

Image quality can be impaired by placing materials directly in front of the image intensifier, or the applied dose is increased by the automatic adjustment. Additional objects in the beam path may result in increased scattered radiation.

Weight counterbalance

Attachment of additional load on the image intensifier or tube assembly side means the loss of weight counterbalance and can lead to unwanted, unexpected or erratic movement of the C-arm.

Users must be alerted to this by a warning label. The responsibility for affixing the corresponding warning label lies with the company that attaches the dedicated option to the C-arm.

Image quality

The attachment of a dedicated option, such as a navigation system, must not affect image quality (impairment of the diagnosis).

After maintenance or service work, the correct function of the non-Siemens system on the image intensifier (e.g. 2D navigation) must be tested.

Electromagnetic compatibility

EN 60601-1-2 must be observed in order to comply with the limit values for electromagnetic compatibility.

Additional safety information

- ❏ Risk of injury due to sharp edges must be avoided.
- ❏ To avoid thermal overloading of components and short circuits, EN 60601-1 Section 7 and, if appropriate, UL 60601-1 must be complied with.
- ❏ Connecting external loads to the power supply of the C-arm system is not permitted.
- ❏ We recommend that users in the EU have the relevant manufacturer of the accessory operated by you, e.g. a navigation system, confirm the CE Declaration of Conformity according to Appendix II, MDD and the Declaration of Compatibility according to Article 12, MDD. In countries outside the EU the relevant national regulations must be observed.

Product liability and warranty are restricted or expire if the above listed conditions and limit values are not complied with when attaching equipment, such as navigation systems.

For non-Siemens options, such as navigation systems, we generally accept no liability.

Disposal

There may be local regulations governing the disposal of your system:

- ❏ If you want to remove the product from service, take into consideration that there may be local regulations and laws governing its disposal. To ensure that these legal regulations are complied with and to avoid potential environmental hazards which may be caused by the disposal of your product, we recommend that you consult Siemens Customer Service.
- ❏ Batteries and packaging material must be disposed of in an environmentally safe manner according to national regulations.
- ❏ For further information on the disposal of this product, please refer to the technical documentation.

SIEMENS

Operator Manual
ARCADIS Orbic

System Description

SP

SPR2-320.620.01.02.02

Please observe the

Safety register

This must be studied thoroughly before system startup.

The original version of this manual was written in the German language.

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SP

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Operator Manual
System Description

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Indications for use

The ARCADIS Orbic is a mobile x-ray system for fluoroscopy and digital spotfilm imaging of patients during surgical and interventional procedures. Clinical applications may include, but are not limited to, cholangiography, endoscopic, urologic, orthopedic, neurologic, vascular, cardiac, critical care and emergency room procedures.

3D option

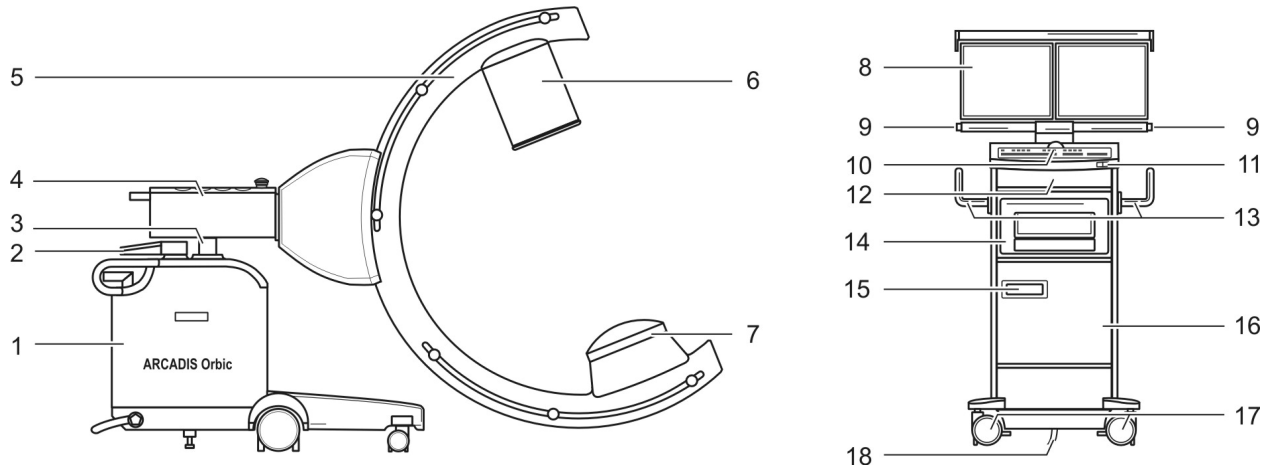
The ARCADIS Orbic 3D option provides 3D imaging and is intended to be used whenever the physician benefits from intraoperatively-generated 3D information of high-contrast objects and anatomical structures.

The 3D Navigation Interface option provides visual support in planning the positioning of instruments during surgical procedures.

Isocenter

The true isocentric design enables a variety of applications where the central beam always remains in the isocenter of the C-arm during the different projections. The possibility of 190° orbital rotation allows easy, unhindered setting of all necessary projections.

System overview



(1) ARCADIS electronic unit

(2) Control panel

(3) Lifting column

(4) Horizontal support arm

(5) C-arm

(6) Image intensifier with integrated TV camera

(7) Single tank with X-ray tube unit and integrated collimator

(8) Monitor A (left); Monitor B (right)

(9) Radiation indicator

(10) Keyboard for data entry

(11) System On/Off button

(12) Storage compartment

(13) Handles

(14) Storage compartment or space for printer

(15) CD drive

(16) Monitor trolley

(17) Castors

(18) Grounding strap

(19) Cable holder (not depicted – on back of monitor trolley)

Operating modes

The ARCADIS Orbic has the following operation modes:

- ❏ Continuous fluoroscopy (CFC) with 30 f/s
- ❏ Pulsed fluoroscopy (PFC) with 8 f/s
- ❏ Digital Radiography (DR)

Options

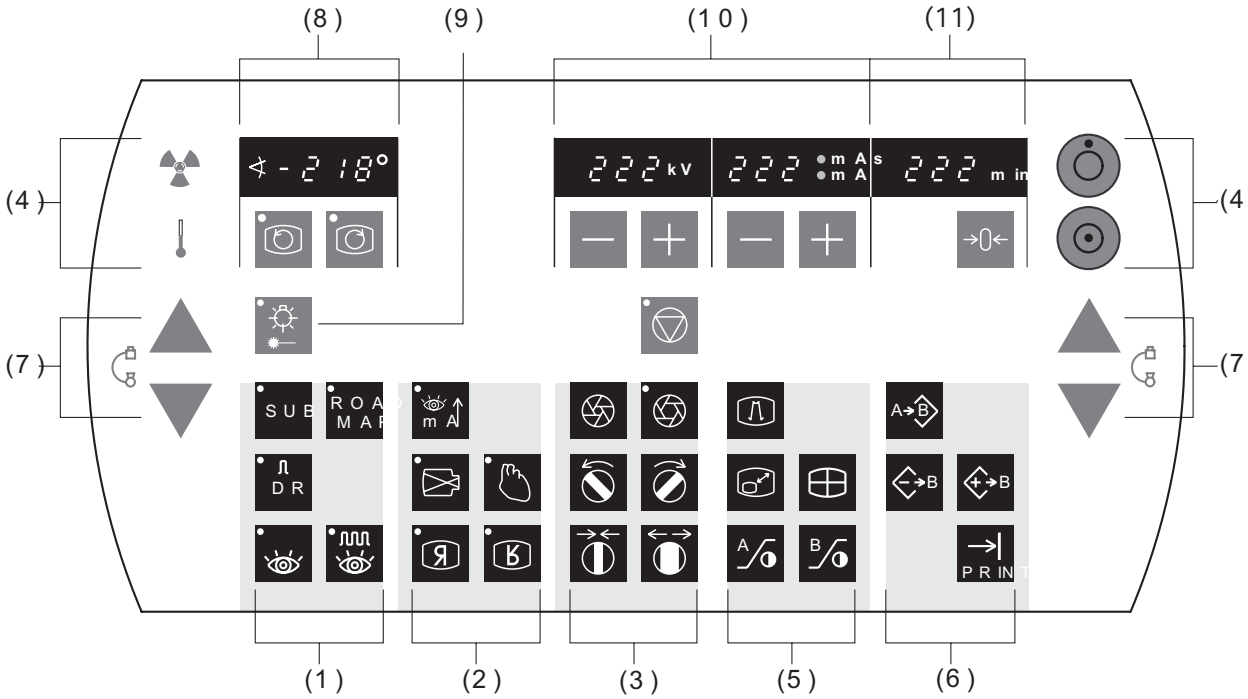
The following options are available for the ARCADIS Orbic:

- ❏ additional operation modes Subtraction and Roadmap
- ❏ Pulsed Fluoroscopy (PFC) 15 f/s
- ❏ Fluoro Loop
- ❏ 2 TFT High-contrast black/white displays (alternative to TFT color displays)
- ❏ Monitor Out Live
- ❏ Monitor Out Live & Reference
- ❏ DICOM Standard (Send/Receive, Storage Commitment, Print)
- ❏ DICOM Query/Retrieve (enhancement of DICOM Standard)
- ❏ DICOM Worklist (enhancement of DICOM Standard)
- ❏ DICOM MPPS (enhancement of DICOM Standard)
- ❏ DICOM Advanced (Send/Receive, Storage Commitment, Print, Query/Retrieve, Worklist, MPPS)
- ❏ Vascular (Subtraktion, Roadmap, Landmark)
- ❏ 3-dimensional imaging
- ❏ NaviLink 2D
  Integrated digital navigation interface for lossless transfer of 2D image data to a navigation system
- ❏ NaviLink 3D
  Integrated digital navigation interface for lossless transfer of 2D and 3D image data to a navigation system
- ❏ 2D measuring function (for measuring angles and distances)
- ❏ HIPAA (Health Insurance Portability and Accountability Act)
- ❏ Local paper printer
- ❏ Local film printer
- ❏ Dose measuring chamber for dose area product/air kerma
- ❏ Integrated I.I. laser aimer
- ❏ Single-tank laser targeting device
- ❏ Horizontal laser light localizer

- ❏ DHHS spacer
- ❏ Grounding cable
- ❏ Sterile covers for the image intensifier, X-ray tube assembly and C-arm
- ❏ Set of clamps

Overview of operating elements and displays

Control panel on the C-arm system



(1) Selection of operation mode

(2) Selection of Power Mode, parameter setting and image reversal keys

(3) Collimator setting

(4) Radiation indicator, power switch and X-ray tube assembly temperature

(5) Image postprocessing

(6) Image selection and storage

(7) C-arm vertical movement

(8) Image rotation

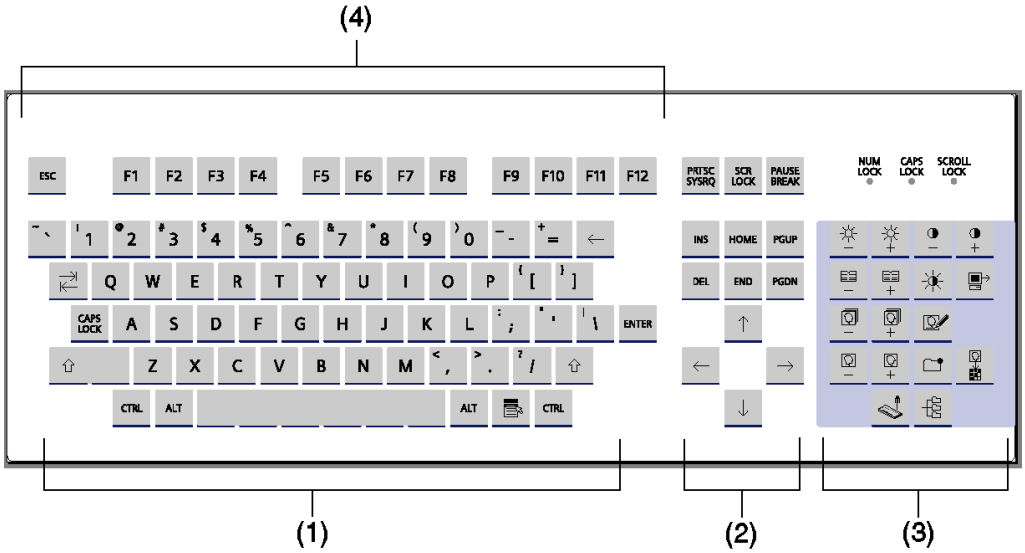
(9) Selection of single-tank laser targeting device

(10) Fluoroscopy parameters

(11) Radiation time

Keyboard at the monitor trolley

The application software for preparing (e.g. entering patient data) and evaluating examinations is operated via the keyboard at the monitor trolley.



(1) Alphanumeric keypad

(2) Cursor keys

(3) Symbol keypad

(4) Function keys

Startup

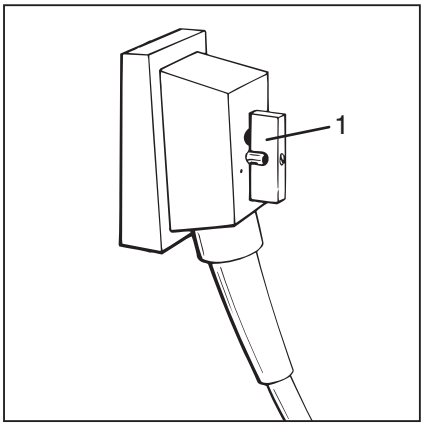
Connecting the C-arm system with the monitor trolley

The C-arm system is connected to the monitor trolley with a cable.

The monitor trolley may only be connected to the corresponding C-arm system. If the monitor trolley is connected to the wrong C-arm system, an error message is displayed during system startup.

Before starting the ARCADIS Orbic, please make sure that the cables are straight (without loops).

Do not lay connection cables parallel to other cables.



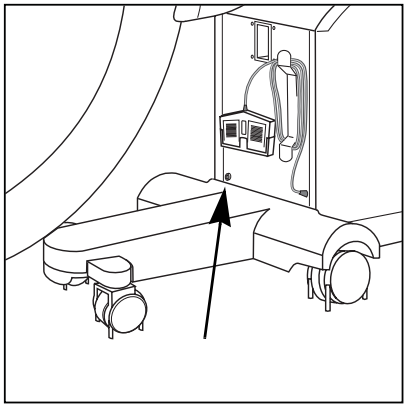
(1) Lever

- Turn the lever of the central plug all the way counterclockwise.
- Plug the central plug into the socket on the front face of the C-arm system.
- Turn the lever approx. ¾ turns clockwise until it audibly locks into place and cannot be turned any further.
  – The monitor trolley is connected to the C-arm system.

Establishing the equipotential bonding connection

The ARCADIS Orbic can be connected to a protective earth terminal via the equal potential connector on the C-arm system. This will ensure that the ARCADIS Orbic has the same electrical potential as other units connected to the same protective earth terminal.

When performing cardiac examinations or examinations of the open skull, an additional grounding cable according to DIN 57107/VDE107 must be routed in rooms of Application Group 2.



- Clamp the grounding cable to the front face of the C-arm system (arrow) and to an equipotential bonding point in the patient vicinity.
  – Equipotential bonding is established.

Switching the ARCADIS Orbic system on

The ARCADIS Orbic is operated via a grounded wall outlet.

- Plug the power plug into the appropriate socket.
  – The mains connection is established.

The mains cable is on the monitor trolley.

- Press the **ON** button at the monitor trolley.

Or

- Press this key on the control panel of the C-arm system.
  – The ARCADIS Orbic is switched on.
  – The system automatically runs a self-test.

After approximately 3 minutes, the ARCADIS Orbic is ready for operation and the following functions are set:

Fluoroscopy mode (CFC).

Iris diaphragm in full format (edges visible).

Semitransparent slot diaphragm in full format.

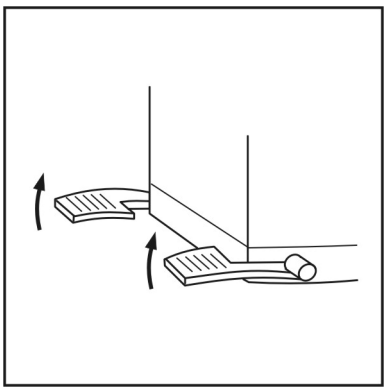
Before beginning the examination, perform the daily function and safety checks.

System movements

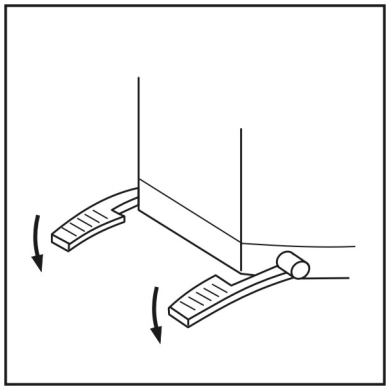
The C-arm system is equipped with 4 wheels for easy steering in any direction. The C-arm system can be locked in place with the foot brake (pedal).

When in operation, the tilt of the C-arm system must be level within ± 5°.

Foot brake



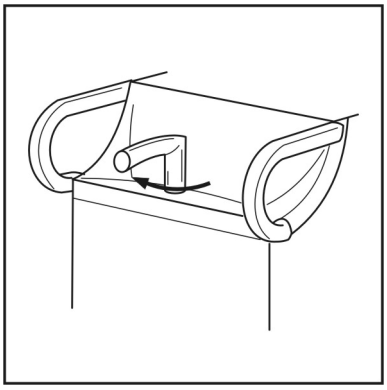
left figure: Foot brake released.



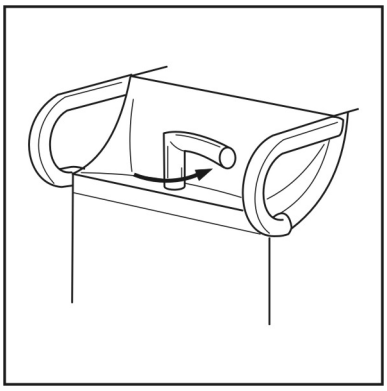
right figure: Foot brake locked.

- Release or lock the foot brake with the pedal (both sides).

Moving the C-arm system by the handles



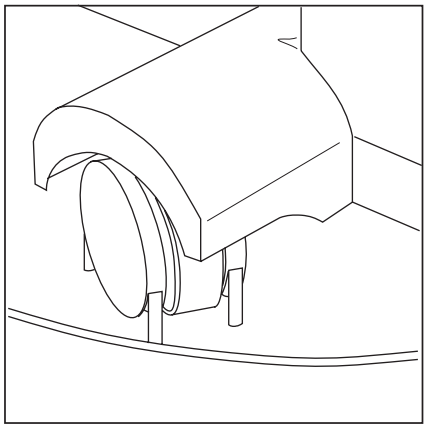
❏ The steering lever can be locked into three different positions: for movement straight ahead, or to the right or left.
– Above: Steering lever shown in the position for forward travel.



❏ Steering lever shown in the indexed position for transverse travel to the right.
– Indexed position left is also possible.

◆ Lift the steering lever and turn it in the desired direction.
– The C-arm system will always move parallel to the lever position (this movement is also possible in unlocked position).

Cable deflectors



❏ To ensure easy maneuverability of the C-arm system, cables lying on the floor are pushed aside by the cable deflectors on the wheels. The C-arm system is not blocked.

C-arm movements

Electromagnetic brakes

On the horizontal carriage you will find a button for every possible movement direction of the C-arm. With these buttons you can release and lock the corresponding electromagnetic brakes. The buttons are color coded. A graduation in the same colors for the corresponding directions of movement is located on the housing.

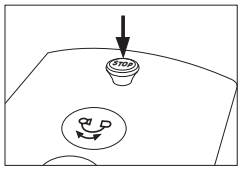
- To release an electromagnetic brake, press the corresponding brake button.
  – When the brake is released, the pilot lamp of the button is switched on.
- To lock an electromagnetic brake again, press the corresponding brake button.
  – When the brake is locked, the pilot lamp of the button is switched off.

Moving

Use the handle to move the C-arm system.

Please lock the corresponding electromagnetic brakes on the horizontal carriage after moving the C-arm system.

Emergency STOP



On the horizontal carriage of the ARCADIS Orbic there is a red EMERGENCY STOP button that can be used to immediately stop motorized vertical movements in a hazardous situation.

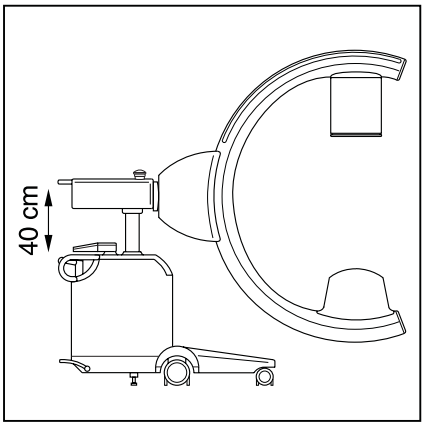
Warning

Motorized vertical movement of the C-arm.

Crushing hazard.

- In the event of danger immediately push the EMERGENCY STOP button.
- Unlock the EMERGENCY STOP button by turning it counterclockwise only when the hazardous situation has been eliminated.

Lifting and lowering the C-arm

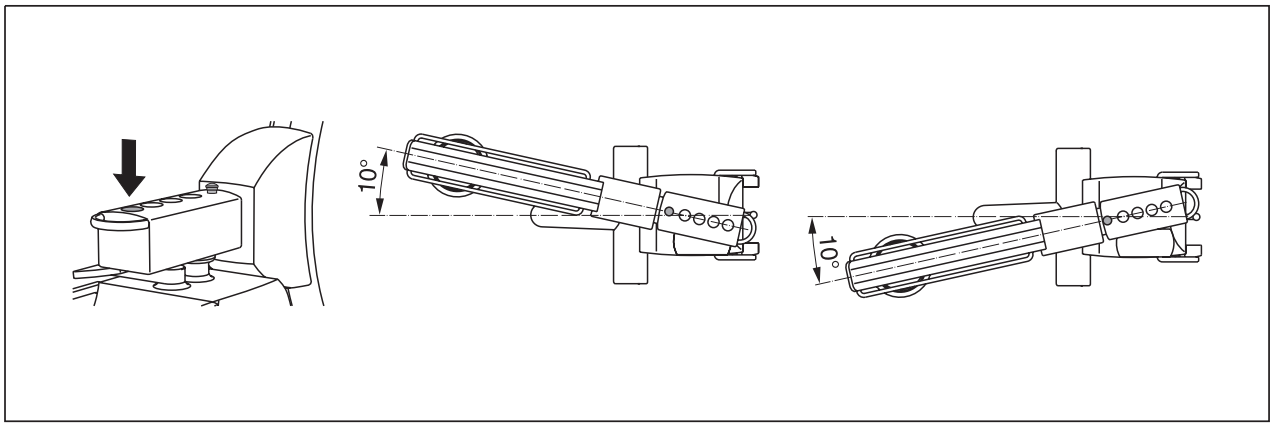


❏ C-arm vertical movement: 40 cm

Lifting the C-arm.

Lowering the C-arm.

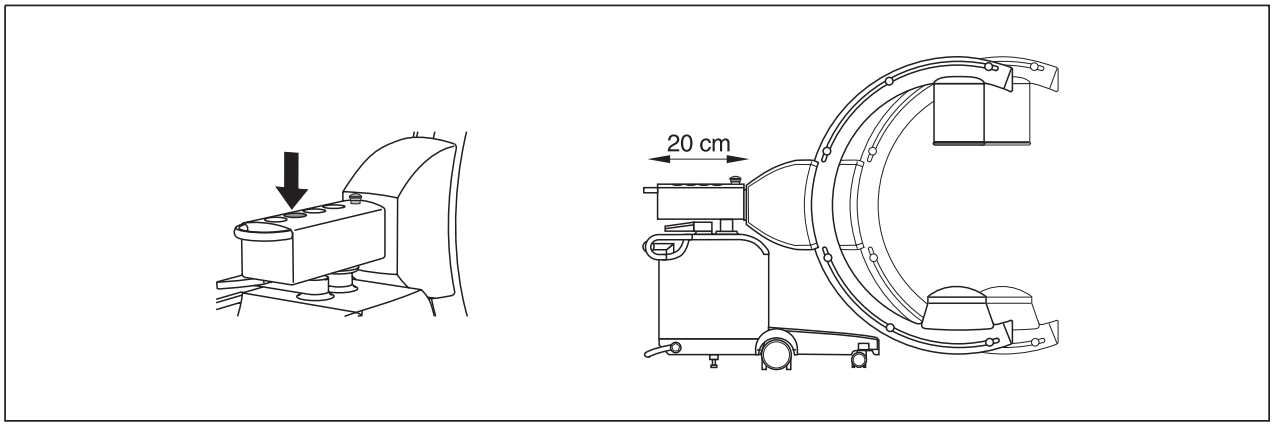
Swivelling the C-arm

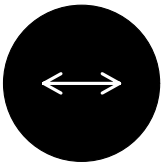


You can move the C-arm horizontally by ± 10° about the system column.

- To do this, release the brake (arrow) and swivel the C-arm.
- Once you have moved the C-arm into the desired position, you must re-engage the brake immediately.

Moving the C-arm horizontally

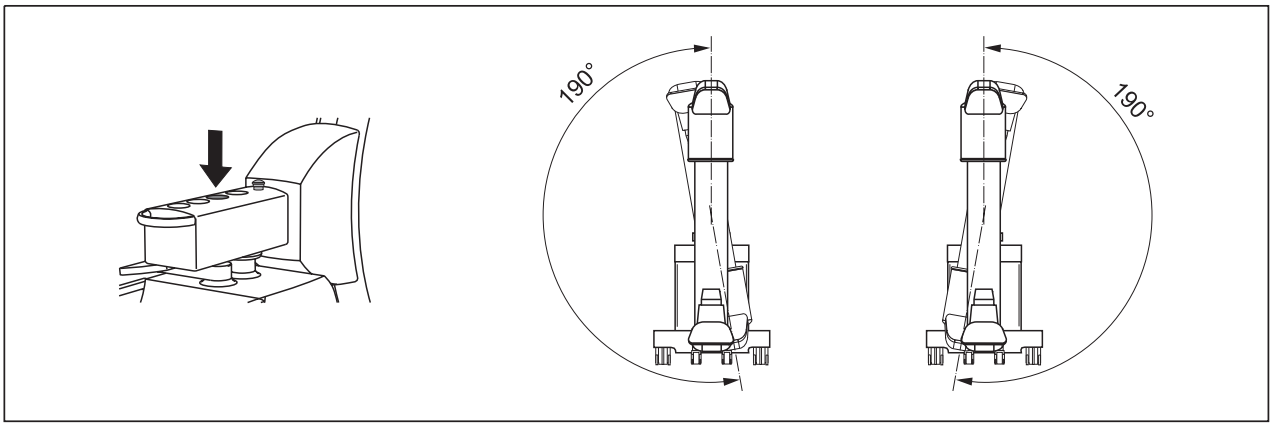




You can move the C-arm horizontally by up to 20 cm.

- To do this, release the brake (arrow) and swivel the C-arm.
- Once you have moved the C-arm into the desired position, you must re-engage the brake immediately.

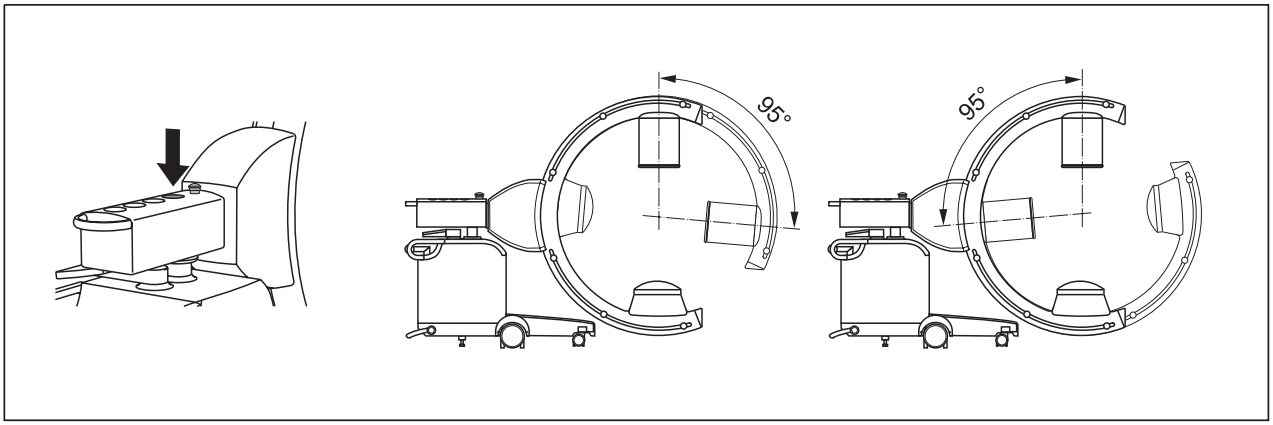
Angulating the C-arm

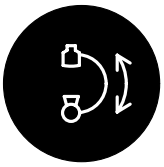


You can move the C-arm vertically by ± 190° about the horizontal support arm.

- To do this, release the brake (arrow) and swivel the C-arm.
  – Scale on joint of support arm.
- Once you have moved the C-arm into the desired position, you must re-engage the brake immediately.

Orbital movement of the C-arm





You can rotate the C-arm by 190° (± 95°).

- To do this, release the brake (arrow) and swivel the C-arm.
  – Marking on outside surface of C-arm.
- Once you have moved the C-arm into the desired position, you must re-engage the brake immediately.

Preparing exposure

Positioning the C-arm

- Align the ARCADIS Orbic.
- Release the brakes and set the C-arm to the required position.
  (→ Page 15)

Warning

As long as the brakes are not locked after movement, the C-arm system can move freely.

Risk of injury to the patient and personnel.

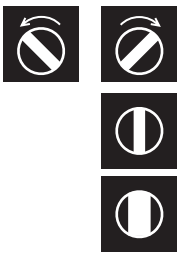
- Lock the brake.

Setting the semi-transparent slot diaphragm

The semi-transparent slot diaphragm is used for collimation primarily when imaging the extremities.

Collimation enhances image contrast and reduces scatter radiation. Direct radiation that passes the soft tissue laterally is reduced to such an extent that the image can be viewed on the monitor without any disturbing differences in brightness.

By rotating the slot diaphragm, the collimated field can be quickly oriented to the direction of the anatomy under examination (e.g. the extremities).



- Press one of these keys.
  – The semi-transparent slot diaphragms are rotated to the left/right.
- Press this key.
  – The semi-transparent slot diaphragm is closed.
- Press this key.
  – The semi-transparent slot diaphragm is opened.

Setting the iris diaphragm

The iris diaphragm is a collimator which serves to reduce radiation exposure to the patient and third parties. Smaller collimation produces less scatter radiation and therefore better image contrast. When the iris diaphragm is fully opened, it must be visible in at least 2 places in the fluoro image.

The X iris leaves are set such that at least two leaves are visible.

When the ARCADIS Orbic is switched on, the iris diaphragm automatically opens to full format.

◆ Press this key.
– The iris diaphragm is closed.

◆ Press this key.
– The iris diaphragm is opened.
– The LED lights up.

When you open/close the iris diaphragm or move the semi-transparent slot diaphragm without radiation, you can see the position of the collimator on the LIH image displayed with a line/circle superimposed.

When you release radiation, the diaphragms are in the position shown in the image.

Selecting the noise reduction factor

◆ Press this key.
– A low integration factor is selected (for recording fast-moving objects). When a low integration factor is selected, the LED lights up.
– If the key is pressed again, the LED goes out. A higher integration factor is selected (for very slow movements).

Selecting the image intensifier format

You can select a zoom format.

When this function is activated, the zoom format symbol is displayed in the Examination task card and the currently set zoom format is indicated (ZOOM).

- Press this key.
  – The LED lights up when this function is selected.

Setting image reversal

- Press this key.
  – The image is flipped vertically.
  – The LED lights up when this function is selected.

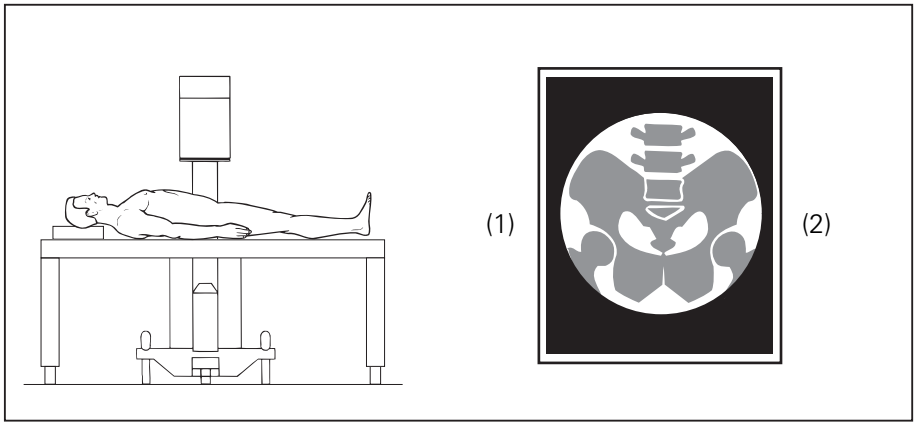
- Press this key.
  – The image is flipped horizontally.
  – The LED is on when this function is selected.

The image reversal is effective only on the left (live) monitor.

Positioning an image for fluoroscopy

To have the image appear on the monitor in the desired orientation during fluoroscopy, you must rotate it.

Object display on the monitor depends upon the C-arm system position relative to the patient.



(1) right side of patient

(2) left side of patient

The rotation angle is displayed on the C-arm system (± 360°). The rotation angle is displayed on the monitor absolute (proportional to the original position) as well as relative (proportional to the previous image).

◆ Press one of these keys.
– The image is rotated in the respective direction.

Selecting the operating mode

You can select the following operating modes for the ARCADIS Orbic:

Fluoroscopy

For fluoroscopy (CFC) you can choose between several exam sets with different characteristic curves to determine exposure parameters for fluoroscopy (DL). Every application allows you to choose between different optimized programs. *Continuous fluoroscopy* is the default setting after switching on the ARCADIS Orbic.

Exposure factors and system control units including the way in which the automatic setting is controlled:

- ❏ 1 K^2 matrix; 30 f/s frame rate; image integration (as a function of the k factor set), i.e. a number of k exposures are integrated into one image; the k factor can be selected between k = 2 and k = 32 and can be assigned to an exam set and stored.

Typical clinical procedure:

- ❏ Fracture reposition of the distal upper extremity (e.g. distal forearm fracture) in the plaster room of an emergency outpatient clinic where, under continuous fluoroscopy, the fracture elements are reduced by extension, fixed temporarily in the best possible position and then fixed permanently by applying a plaster cast.

Pulsed fluoroscopy

This operating mode (frame rates up to 15 f/s) allows a reduction in radiation dose of up to 70 % for the patient and operator. The pulse duration is generally 7 milliseconds. According to the level of noise reduction, many different fluoroscopic images can be integrated. For frame rates less than or equalling 2 frames per second a type of intermittent continuous fluoroscopy is used where the pulse duration varies depending on the noise reduction set.

Exposure factors and system control units including the way in which the automatic setting is controlled:

- ❏ 1 K^2 matrix; frame rate usually 4 to 15 f/s; image integration (as a function of the k factor set), i.e. a number of k exposures are integrated into one image by sliding averaging; the k factor can be selected between k = 1 and k = 8 and can be assigned to an exam set and stored.

Typical clinical procedure:

- ❏ Fracture reposition of the distal upper extremity (e.g. distal forearm fracture) in the plaster room of an emergency outpatient clinic where, under continuous fluoroscopy, the fracture elements are reduced by extension, fixed temporarily in the best possible position and then fixed permanently by applying a plaster cast, with the additional advantage of dose savings for the patient and medical staff.

Digital radiography

Digital radiography (DR) provides an electronic instant image of the patient on the monitor. DR is recommended for final exposures. The exposure time depends on the noise reduction set.

Exposure factors and system control units including the way in which the automatic setting is controlled:

- ❏ 1 K^2 matrix; 1 f/s frame rate, with image integration, depending on the setting; X-ray pulse with 7 ms up to approx. 1400 ms width, depending on the noise reduction set.

Typical clinical procedure:

- ❏ Final follow-up exposure of a fracture reposition of the distal upper extremity (see above).

Subtraction/ Roadmap (option)

The subtraction memory option allows you to perform a digital subtraction angiography and simultaneously display the unsubtracted angiogram on the second monitor. Subtraction technique allows hemodynamic display as well as display of the maximum vascular filling and Roadmap. The Roadmapping features can also be used for other interventional procedures.

Exposure factors and system control units including the way in which the automatic setting is controlled:

- ❏ 1 K^2 matrix; continuous fluoroscopy; storage rate usually 3 to 8 f/s; image integration (as a function of the k factor set), i.e. a number of k exposures are integrated into one image; the k factor can be set between k = 1 and k = 32 by an authorized technician.

Typical clinical procedure:

- ❏ Display of an arterial vessel for localizing vascular stenoses with injection of a contrast medium to enable the contrast-enhanced display of the vascular filling (subtraction of the native image (mask) from the contrast-enhanced image).
- ❏ Alternative to native image display, subsequent inversion of the displayed image allows you to display a catheter introduced into the vessel path using the Roadmap function.

When an operating mode is selected, the integrated LED lights up. The current operating mode is deselected when switching to another mode.

By repeatedly pressing an operating mode key that is already activated, you can scroll through the exam sets assigned to the corresponding operating mode. This is possible only if a patient has been registered.

Continuous fluoroscopy

- Press this key.
  - *Fluoroscopy* mode is selected.
  - The LED lights up.

When the ARCADIS Orbic is switched on, it automatically defaults to **Fluoroscopy** *mode.*

Pulsed fluoroscopy (PFC)

- Press this key.
  - *Pulsed Fluoroscopy* mode is selected.
  - The LED lights up.

Digital radiography (DR)

Digital radiography (DR) provides an electronic instant image with best image quality. It is recommended for final exposures.

On activation of digital radiography a short radiation pulse is released.

- Press this key.
  - *Digital Radiography DR* mode is selected.
  - The LED lights up.

Depending on the k factor selected and the build of the patient, the radiation pulse can be > 0.5 s (EN 60601-2-7/29.1.103).

High-contrast fluoroscopy (Power Mode)

For high-contrast fluoroscopy you can switch from the normal characteristic to the "high-contrast" characteristic. This characteristic temporarily enables maximum output in continuous fluoroscopy (CFC).

At the end of the exposure (max. 15 s) the "high-contrast" Power Mode switches off automatically. During the exposure an acoustic warning signal is emitted. If the ARCADIS Orbic is connected to an insufficient mains supply (e.g. high internal resistance), the maximum time of 15 s is automatically reduced in the CFC mode.

In the DR mode, "high contrast" is selected by default (LED lights up) and cannot be deselected.

"High contrast" is not possible in the PFC, SUB and Roadmap modes.

- Press this key.
  - *High contrast* is selected.
  - The LED lights up.
- Press this key again to switch "high contrast" off.
  - *High contrast* is deselected.

If the X-ray tube overheats, high-contrast fluoroscopy cannot be selected; the overload protection will change the characteristic curve.
(→ Register Safety, Page 14)

If you select another operating mode or change the exam set, the selection of SIREMATIC curves will change. This depends on the corresponding setting of exam sets.

Subtraction (SUB)

The subtraction technique enables the isolated display of the vascular system after contrast injection by means of background subtraction.
(→ Register Examination, Page 19)

◆ Press this key.
– *Subtraction* mode is selected.
– The LED lights up.

Roadmap

The Roadmap technique allows the user to accurately place a catheter into a blood vessel under fluoroscopy.
(→ Register Examination, Page 19)

◆ Press this key.
– *Roadmap* mode is selected.
– The LED lights up.

Setting the X-ray parameters manually

The default X-ray parameters can be changed manually with the +/- keys for kV/mA.

Automatic dose rate control

Using dose rate control, the mean value of the image gray values is held constant within the dominant largely independent of the object transparency. This ensures optimal image quality for on-screen evaluation. The position of the dominant is centered to the image intensifier input.
(→ Register Technical Description, Page 4)

There are three factory default settings for the dose rate: reduced dose, standard dose, increased dose (for 23 cm/9" I.I. 0.11/0.185/0.37 µGy/s).

Activating ADR stop

When metallic objects (e.g. intermedullary nails) are introduced into the beam path or when examining objects of varying density (e.g. hip prosthesis) under fluoroscopy, it is recommended that you set the kV just established with the **Dose rate control Stop** key at the start of fluoroscopy.

- Press this key.
  - The stop function is switched on, the LED lights up.
  - Automatic dose control is disabled.
  - The +/- keys for kV/mA are enabled.

Setting the X-ray parameters manually

You can set the kV/mA values manually by activating the **Dose rate control Stop** key.

- Press the +/- keys briefly.
  - The kV/mA values are increased/reduced.
  - The set values are displayed.

Or

- Keep the +/- keys pressed for a period of time.
  - This results in a continuous increase/decrease of the particular X-ray parameters.

Once the upper or lower limit of the setting range is reached, an acoustic signal is emitted every time you press the key again.

The mA values assigned to the kV values result from the SIREMATIC curves.
(→ Register Technical Description,Page 3)

On reaching the end of the curve, the iris diaphragm is opened. The LED flashes.

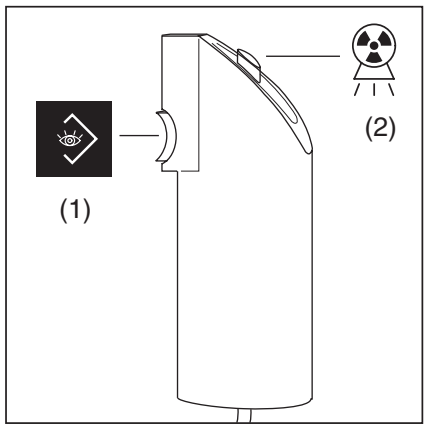
If the iris diaphragm is opened to maximum, an acoustic signal sounds.

Radiation release

Using the hand switch

The hand switch is used to remote control radiation release and image storage.

The hand switch can be connected on either side of the C-arm system.



(1) Button for saving images

(2) Release button

Releasing radiation

- Use the button to release the exposure.
  – Radiation is released in the selected operation mode.
  – The current radiation parameters are displayed on the control panel of the C-arm system.

During the exposure or after ending the exposure, an acoustic warning signal sounds (can be configured).

Confirming a warning signal

When the fluoroscopic time exceeds 5 minutes, an audible alarm sounds.

- Press the **reset key** on the control panel of the C-arm system.
  – The acoustic warning signal is deactivated. The fluoroscopic timer continues to display the amount of fluoro time used.

5 Minutes after reset, the alarm signal sounds again.
10 Minutes after the last reset radiation is automatically disabled.

Storing images (during radiation)

- Press this button on the hand switch during radiation.
  – The image currently generated and displayed is saved in the local database. (→ Register Examination, Page 16)

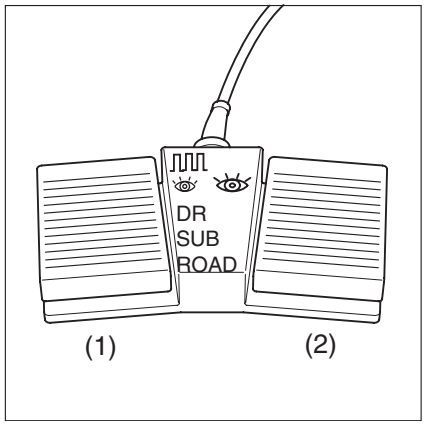
Storing images (after radiation)

- Press this button on the hand switch.
  – The last acquired image is stored.

The ARCADIS Orbic transfers images from monitor A to monitor B and then stores them in the local database.

Using the footswitch

The footswitch is used if both hands need to be free during the exposure.



(1) left footswitch

(2) right footswitch

Warning

When the C-arm is rotated by 180° and lowered to maximum, the I.I. could touch the footswitch.

Unintentional release of radiation

- Please make sure that the footswitch is not located underneath the I.I.

Releasing radiation

The right pedal is always used to activate fluoroscopy (CFC).

The left pedal is used to activate the currently selected operating mode. *Exception*: If fluoroscopy (CFC) is selected, the left pedal is assigned the digital radiography (DR) mode.

- Keep the foot pedal pressed during radiation release.

Shutdown

Before disonnecting the ARCADIS Orbic from the mains, you must shut it down.

During the shutdown procedure the imaging system is powered down. There are two different shutdown procedures, each having a different reset time.

❏ Simple shutdown
The imaging system goes into Hibernate mode before it switches off. When the ARCADIS Orbic is switched on again, it will be ready for operation after only approx. 45 s.
Simple shutdown can be performed up to 12 times in a row. After that, a complete shutdown is performed automatically. After you have performed the simple shutdown procedure 10 times in a row, a message is displayed before the system is shut down completely.

❏ Complete shutdown
The imaging system is shut down completely before it switches off. When the ARCADIS Orbic is switched on again, it will be ready for operation after approx. 3 min.
For technical reasons a complete shutdown must be performed on a regular basis. Unless initiated by you, a complete shutdown is performed automatically when the system is shut down for the 13th time.

The shutdown procedure used depends on how you switch off the ARCADIS Orbic.

If you want to ensure a very short power-up time of your ARCADIS Orbic, we recommend that you initiate a (complete) shutdown yourself before the maximum number of 12 (simple) shutdown procedures is reached. You can do this during a break between examinations, for example, and then switch the ARCADIS Orbic on again in time before the next examination.

Switching the system off

◆ Close the current examination by selecting **Patient > End examination** in the main menu of the **Examination** task card.

◆ Make sure there is no CD in the drive.

If there is a CD in the drive when you restart the ARCADIS Orbic, the system will not recognize the CD drive. In this case you would have to remove the CD, switch the system off and then restart it.

Simple shutdown

◆ Press the **OFF** button at the monitor trolley.

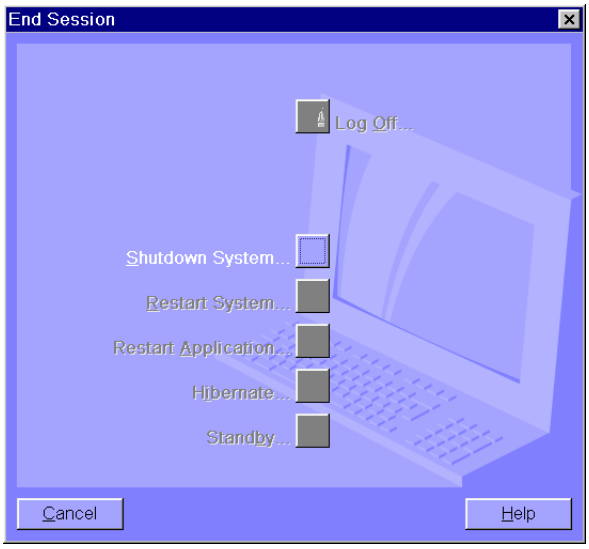
– Or –

◆ Press the **OFF** key on the control panel of the C-arm system.
  – The C-arm system is immediately shut down.
  – The imaging system and monitor A switch off after the computer has been shut down.

The system can be restarted as early as 5 seconds after pressing the OFF button (even during shutdown).

Complete shutdown

◆ Select **Options > End Session** from the main menu at the monitor trolley.
  – The **End Session** dialog box opens.

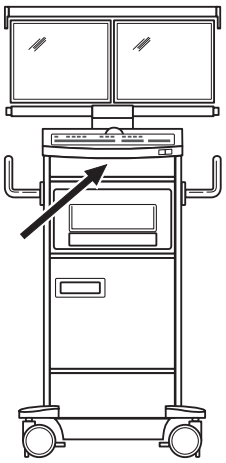


◆ Click **Shut down system**.
  – The imaging system is completely shut down.

◆ Press the **OFF** button at the monitor trolley.

– Or –

◆ Press the **OFF** key on the control panel of the C-arm system.
  – The C-arm system, the imaging system and the monitors are switched off.



Reactivating the system

If the imaging system cannot be shut down properly after pressing the **OFF** button and does not react any more, you must deactivate the system as follows:

- Press the **Reset** button at the bottom of the key panel at the monitor trolley.
  – All running processes are aborted and the ARCADIS Orbic is shut down.
- Switch the ARCADIS Orbic on again and let it boot up completely.
  – Now you can either continue using the ARCADIS Orbic or shut it down.

If the ARCADIS Orbic is not fully operational in spite of resetting it, please notify Customer Service.

Transport

The C-arm system is equipped with 4 wheels for easy steering in any direction. The C-arm system can be locked in place with the foot brake.

Caution

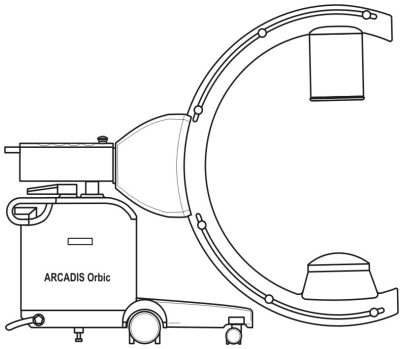
When transporting the C-arm system as well as the monitor trolley, the incline of the ramp or floor must not exceed ± 10°.

The C-arm system can tip over.

- Avoid an inclination of more than ± 10°.

Transport and parking position of the ARCADIS Orbic

Preparing the C-arm



- Release all brakes of the C-arm.
- Set the C-arm to the transport position shown in the drawing.
  – Angulation 0°/Orbital position 0°.
- Move the system column downwards.
- Move the horizontal carriage all the way back.
- Lock all brakes of the C-arm again.

Disconnect the power plug

- Switch off the ARCADIS Orbic.
- Pull the power plug out of the wall outlet.

Pull on the plug, not on the cable!

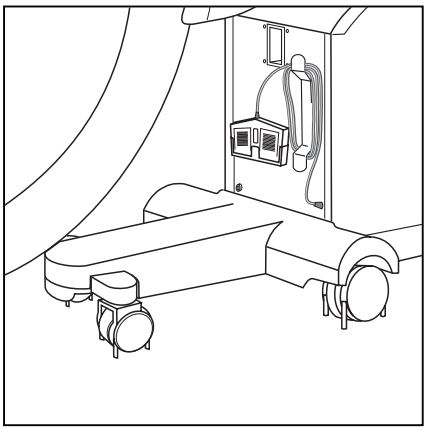
The ARCADIS Orbic can be switched on again after approx. 5 s.

Please note that after finishing an examination, the ARCADIS Orbic must be shut down properly before it is disconnected from the power supply.

Disconnecting the central plug

- Turn the lever ¾ counterclockwise and remove the plug.
  – The central plug is disconnected from the monitor trolley.
- If attached, disconnect the grounding cable from the C-arm system.

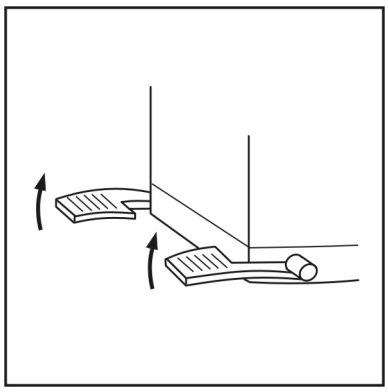
Rolling up the footswitch cable



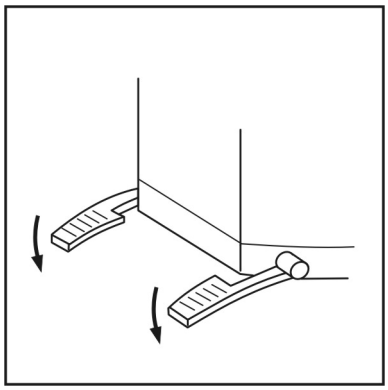
- Roll up the footswitch cable at the front of the unit and attach the footswitch.

When attaching the footswitch, please be careful not to kink the cable.

Driving the unit

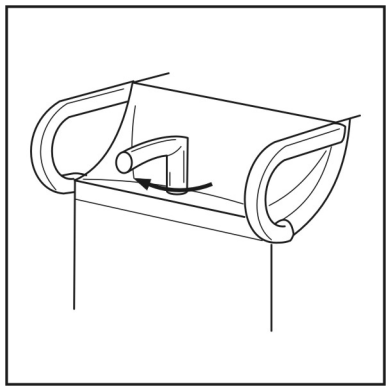


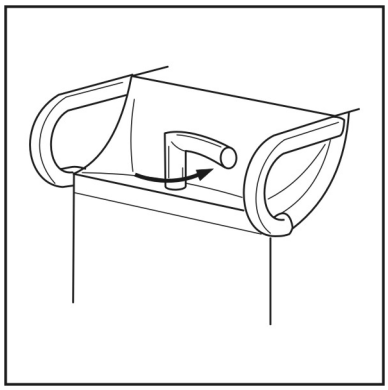
left figure: Foot brake released.



right figure: Foot brake locked.

◆ Release the foot brake.





left figure: Steering lever shown in the position for forward travel.
right figure: The steering lever can be locked into position for transverse travel to the right or left.

◆ Lift the steering lever and turn it in the desired direction.

The steering lever can be locked into three different positions. One is for movement straight ahead, the others for transverse travel to the right or left.

◆ Move the C-arm system by hand.
  – If the steering lever is in a transverse position, the C-arm system moves parallel to the lever position..

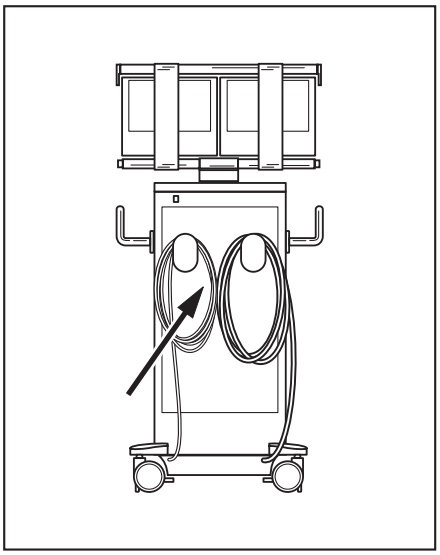
When transporting the C-arm system make sure there are no obstructions on the floor.

Monitor trolley transport position

During transport, the rolled-up power cable and the connection cable for the C-arm system should be placed on the cable holders on the back of the monitor trolley.

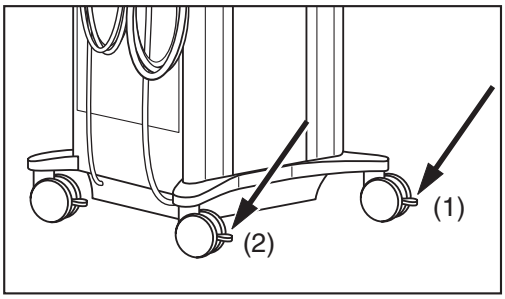
Do not place the rolled-up cables on the handles.

Depositing the connection cable



- Place the rolled-up cable on the transport holders.

Driving the unit



- Release the brakes (blue footswitches) on the front wheels (see arrow (1)).
- Use the directional locks on the back wheels for long straight distances (see arrow (2)).

SIEMENS

Operator Manual
ARCADIS Orbic

Patient Data

SP

SPR2-320.620.01.02.02

Please observe the

Safety register

This must be studied thoroughly before system startup.

The original version of this manual was written in the German language.

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SP

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Introduction to patient registration

Before you can examine a patient with your system, you must register the patient.

Registration means that you give your system all the information about a patient that it requires for an examination.

Depending on how registrations are organized in your hospital and how much time you have for registration, you can choose between different patient registration procedures.

Emergency registration

If a patient is admitted who is in an extremely critical condition and must therefore be examined and treated immediately, call up emergency registration. This reduces the time before you can begin the examination to a minimum.

Registration for the examination

However, if you want to register a patient for an examination, you first enter the patient's data or call it up from the database and then examine the patient.

Preregistration

If you want to prepare the system to examine a patient at a later time, then you can preregister the patient.

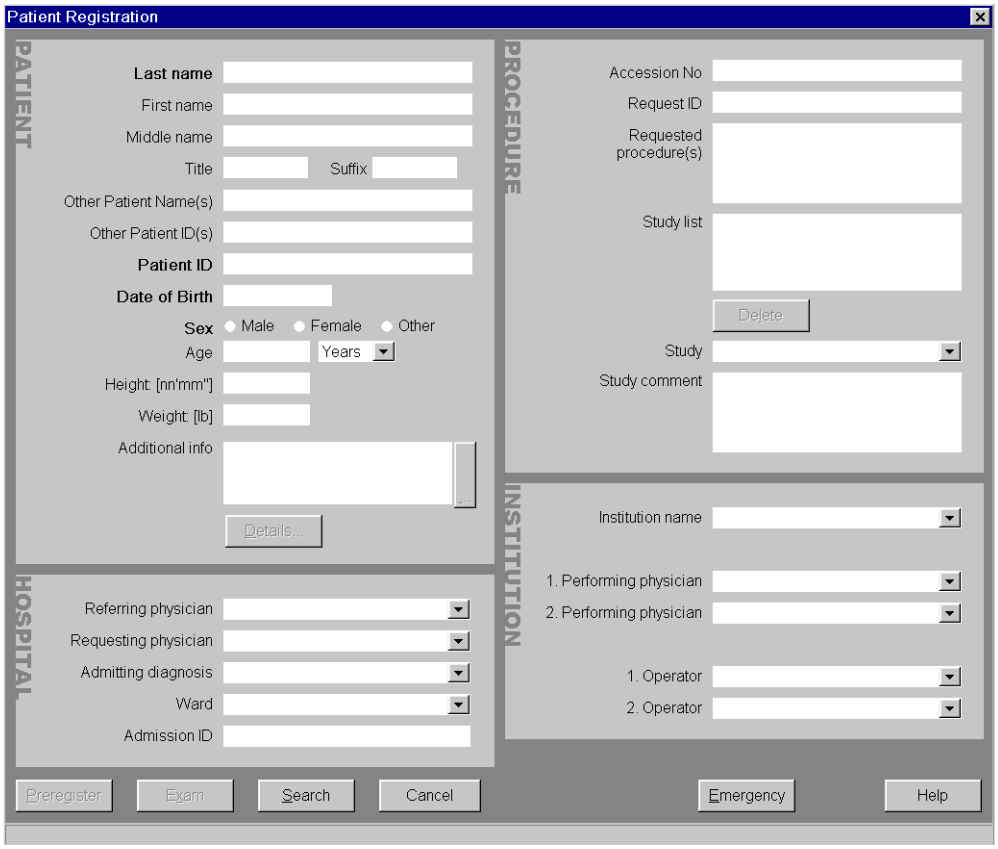
For example, you can enter the data in the morning for all the patients to be examined during the day. When you want to begin an examination, simply call up the relevant data and edit them, if necessary. This saves time during the examination.

HIS/RIS query

If your system is connected to a HIS/RIS system (hospital and radiology information system), you can call up data for the patient to be examined for preregistration or registration.

The Patient Registration window

The **Patient Registration** window is subdivided into four areas into which you can enter topically coherent data.



(1) Personal data of the patient (PATIENT)

(2) Hospital-specific data (HOSPITAL)

(3) Study-specific data (PROCEDURE)

(4) Institution data (INSTITUTION)

The input fields can be adapted by Siemens Service.

Emergency registration

An emergency registration is performed if a patient must be examined and treated immediately, without wasting time entering the patient's data.

You can register an emergency patient either in the **Emergency Registration** or in the **Patient Registration** window.

If you release radiation without having registered a patient for the examination, a corresponding dialog box is displayed. After radiation has been released again, an emergency patient is automatically registered. You can register an emergency patient by releasing radiation twice with the hand switch or footswitch. Thus entries at the monitor trolley are unnecessary.

Provisional patient data

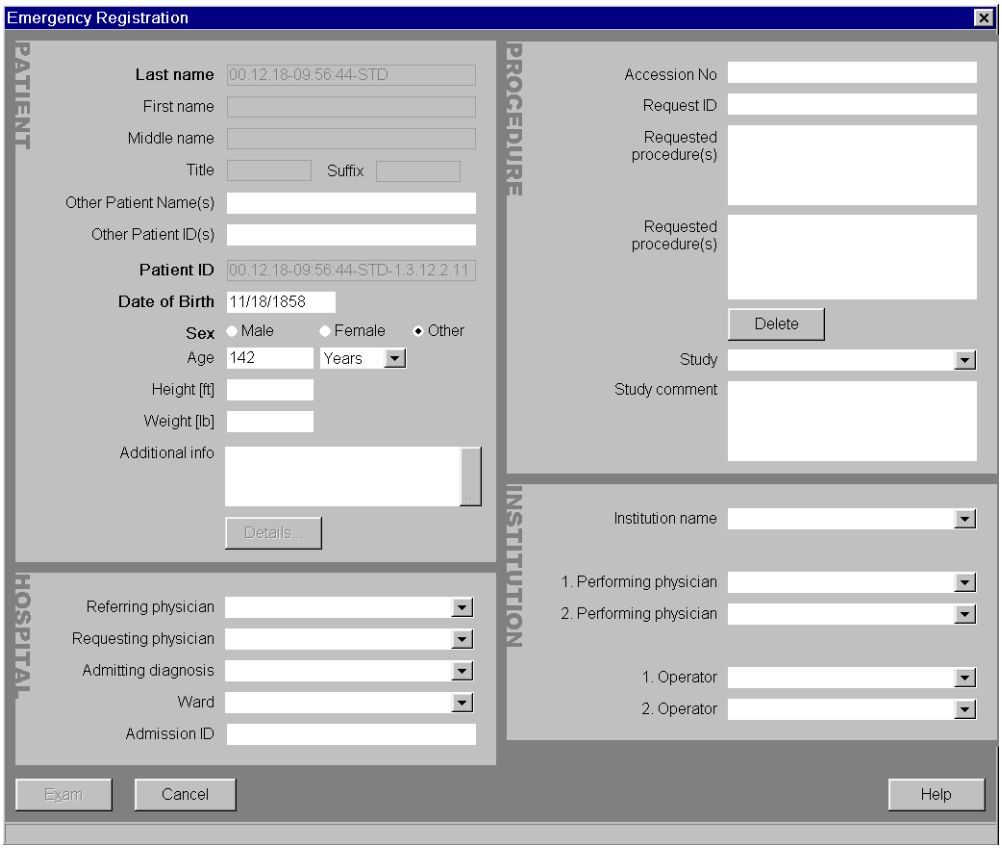
The patient is registered with provisional data as an emergency patient. As soon as you have more time after the examination, you must complete the patient and examination data of your emergency patient using the **Patient Browser**.

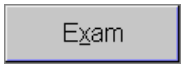
Emergency Registration window

- First finish off or interrupt the current examination.
- Press the button in the tool bar of the **Patient Browser**.

— Or —

- Call up **Patient > Emergency** in the main menu.
  – The **Emergency Registration** window opens.

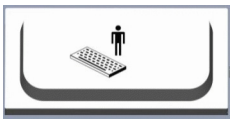




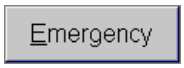
◆ Click on the **Exam** button in the **Emergency Registration** window.
– The **Emergency Registration** window is closed.
– The **Examination** task card is opened.

By clicking Cancel you can stop emergency registration at any time, e.g. if you have accidentally called up the Emergency Registration window instead of the Patient Registration window.

Emergency registration in the Patient Registration window



- First finish off or interrupt the current examination.
- Press the key on the symbol keypad.
  – The **Patient Registration** window is displayed.



- Click the **Emergency** button in the **Patient Registration** window.
  – The **Patient Registration** window is closed.
  – The **Examination** task card is opened.

Registering a new patient

If a patient has never been examined in your hospital or practice before, no data about this patient will be stored on your system.

Therefore all the data of this patient must be entered before an examination.

Registering

If you register a patient and want to examine this patient immediately afterwards, enter all the examination-relevant data into the corresponding input fields.

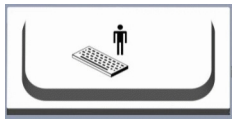
Preregistration

If you only want to preregister the patient for later examination, you must fill in at least the mandatory input fields. These are emphasized by bold letters (sex, name, patient ID and date of birth).

Opening Patient Registration

The data of a new patient are entered into the empty **Patient Registration** window.

You can call up patient registration from the **Patient** menu, via icon buttons on the **Viewing** task card as well as from the **Patient Browser**.



◆ Press the key on the symbol keypad.

Or

◆ Click the corresponding button on the **Viewing** task card/**Patient** subtask card or in the tool bar of the **Patient Browser**.

Or

◆ Select **Patient > Register**.
– The **Patient Registration** window opens.

If you call up patient registration from the **Patient Browser***, make sure that you have not selected a patient or study there. Otherwise the selected data are transferred to the* **Patient Registration** *window.*

Entering data

After you have called up patient registration, the cursor is in the input field for patient name in the **PATIENT** area.

The **Exam** and **Preregister** buttons remain deactivated until you have entered all the information required to register or preregister a patient.

Personal data

Name, patient ID, age, and sex of the patient are mandatory entry fields. This information uniquely identifies the patient in your databases.

If you do not enter a **Patient ID***, your system automatically generates an identification code from the date, time, abbreviation for daylight-saving or standard time, and the identification number of your system (unique worldwide).*

Caution

For internal identification of patient data, e.g., studies, series and images, the system time is used. By resetting the system time duplicate identifiers may be created.

Data may be assigned to the wrong patient.

- If it is necessary to reset the system time for synchronization, wait until the new system time is later than before.

- Enter the personal data of the patient (at least the mandatory input fields) in the **PATIENT** area.

The valid input format for the **Date of birth** *is displayed in the status line. Enter the year of birth using four digits.*

If you do not know the date of birth you can enter the estimated **age***. The system then calculates a date of birth from the current date. In the selection field next to it you can specify whether the age is in years, months or days (for example for infants).*

Hospital-specific data

In the **HOSPITAL** area, you can enter the referring physician, the preliminary diagnosis, and the hospital ward where the patient is located.

- Enter the hospital-specific data via the keyboard.

Or

- Select the entries you require from the selection lists.

Examination data

In the **PROCEDURE** area, data from the HIS/RIS system (option), if connected, are entered automatically.

- Do not enter any data here.

After you have registered the patient, the data for the upcoming examination can be entered in the **Examination** *task card.*

Institution data

In the **INSTITUTION** area, you enter the information about the examining institution and the personnel performing the examination. This information can be helpful if the examination results are passed on to a different organization for reporting.

- Enter the institution data via the keyboard.

Or

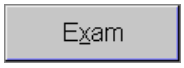
- Select the entries you require from the selection lists.

Completing data entry

After you have entered all the necessary patient data in the **Patient Registration** window, you can register the patient for the ensuing examination or preregister him or her for examination later on.

Registering a patient for the examination

If you want to examine the patient directly afterwards, register the patient now. The ensuing examination is conducted with the data that you have entered.



◆ Click the **Exam** button.
  – The **Examination** task card is displayed.
  – Now you can start examining the patient.

Preregistering a patient

You can preregister the patient with the data entered if you want to perform the examination later on. You can then access the patient data again when you start the examination.
(→ Page 15)

◆ Click the **Preregister** button.
  – The patient is included in the scheduler. The input fields of the **Patient** area in the **Patient Registration** window are empty again. You can enter the data of the next patient.

Registering a known patient

A patient who is preregistered or has already been examined in your hospital or practice is known to your system.

You can search for the patient in the databases and transfer the information stored into the **Patient Registration** window.

Resuming a commenced study (e.g. IVP)

Adopt the examination data of a patient additionally to the personal data, if you want to resume his or her study. You can then resume the study.

HIS/RIS query

If the patient's data have already been entered via a HIS/RIS system, you can query the data from the hospital network and transfer them to the scheduler. The patient is then preregistered.

The scheduler is updated via the HIS/RIS system at regular intervals. If the patient registered for examination does not appear in the scheduler, although he/she has been entered via the HIS/RIS, update the scheduler manually by double-clicking the scheduler icon. This is advisable in particular after switching on or re-starting the ARCADIS Orbic.

Searching in the Patient Registration window

You can search for patient data in the databases from the **Patient Registration** window and then use the data for registration.

In **Registration Configuration** *you can define which databases (e.g. local database, local archive) are to be searched.*
(→ Page 24)

Starting a search

- Call up the empty **Patient Registration** window.
- Enter the data known to you in the **Last name** and **Patient ID** fields.

If you know only part of the name or ID of the patient you are looking for, you can use the asterisk "" as a wildcard.*

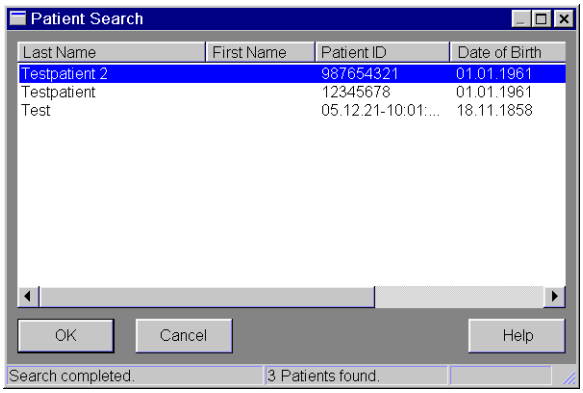
It does not matter whether your entries contain upper or lower case letters.

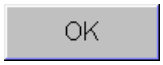
- Click **Search**.
  - The databases of your system are now searched for the patient with the data entered.
  - During the search, the **Cancel** button is displayed instead of the **Search** button. Thus you can cancel long search processes.

Accepting patient data

If only one patient was found at the end of the search, this patient's personal data are automatically transferred to the **Patient Registration** window.

As soon as a second patient was found, your system displays the **Patient Search** window with the hit list.





- Select the patient in the search list and click **OK**.

Or

- Double-click the required patient.
  - The personal data of the selected patient, for preregistered patients all data entered previously, are transferred to the **Patient Registration** window.

Repeat your search with changed entries and/or extend the search to further databases.

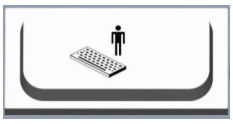
Searching in the Patient Browser

You can also use the **Patient Browser** to search for a patient in the scheduler, a database and in the local archive (inserted data medium). You can then transfer the data to the **Patient Registration** window. You can simplify your search by filtering and sorting the patient data.
(→ Page 31)

- First select the database from which you want to transfer the patient data.
- Click the required patient entry in the navigation or content area of the **Patient Browser**.

— Or —

- Select the study or studies of the patient that you want to perform or repeat.
- Press the key on the symbol keypad.

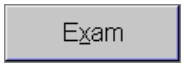


— Or —

- Select **Patient > Register** to open the Patient Registration window.

Completing your entries

After you have transferred the patient data you searched for into the **Patient Registration** window, check that the data are correct and, if necessary, add any missing data before registering the patient.



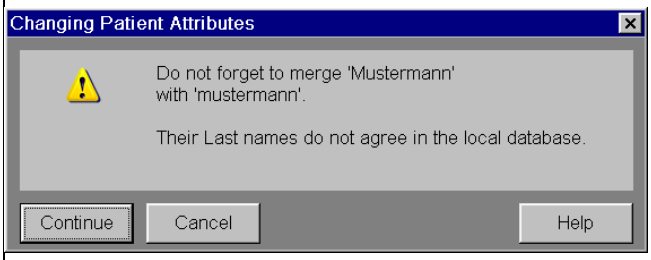
- Click **Exam** if you want to examine the patient next.
  - The patient is registered for examination.
  - The examination data are transferred to the **Examination** task card and you can begin the examination.

Or

- Click **Preregister** to preregister the patient.

The **Changing Patient Attributes** *window is displayed.*

If you have transferred the patient from the local database and made corrections to that patient's personal data, this message box appears.


Changing Patient Attributes
Do not forget to merge 'Mustermann' with 'mustermann'.
Their Last names do not agree in the local database.
Continue
Cancel
Help

Do not forget to correct the patient data in the original record later on.

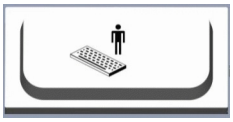
Close the message window with **Continue**.

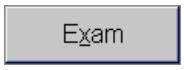
Resuming a commenced study

You can resume an incomplete study of a patient.

All newly generated images are appended to the existing study as a new series.

- Call up the **Patient Browser**.
- Select the relevant study.
- Call up the **Patient Registration** window.





- Click the **Exam** button.
  – The **Examination** task card is displayed and you can resume the study.

Patient Registration configuration

You can adapt patient registration flexibly to the individual requirements of your examination practice.

You can change the following default settings:

- ❏ The entries in the selection lists of the **Patient Registration** window.
- ❏ Selection of the databases that you want to be searched when using the search function as well as the search procedure and display of the search results.
- ❏ Worklist settings, if a HIS/RIS system is connected.

Calling up the configuration window

You can call up the configuration window from the syngo Configuration Panel.

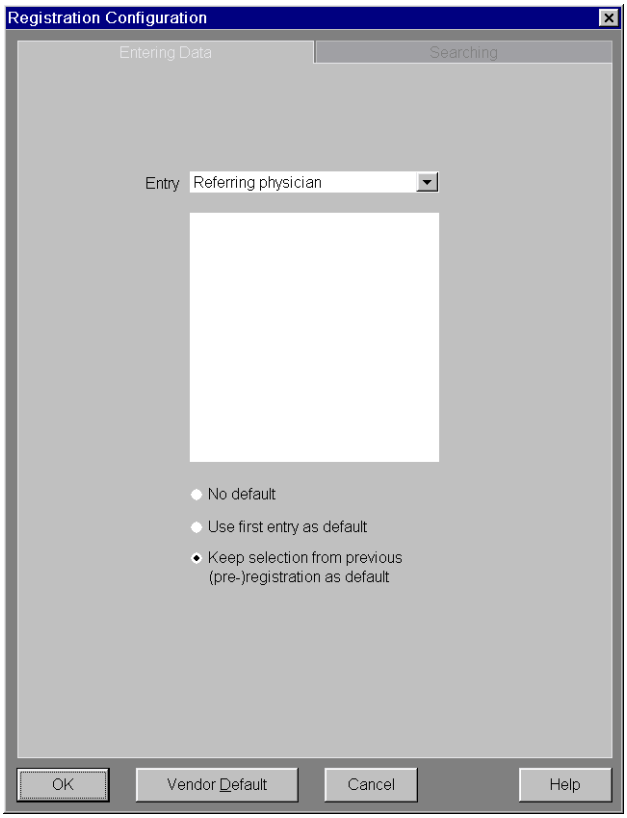
Patient Registration

- ◆ Select **Options > Configuration** in the main menu.
- ◆ Double-click on the Patient Registration icon.
  – The **Registration Configuration** window is displayed with the **Entering Data**, **Searching**, and **HIS/RIS** cards.

The **HIS/RIS** *card is displayed only if your system is connected to a hospital or radiology information system and configured and licensed accordingly.*

Configuring selection lists

In the **Entering Data** card you can create selection lists. During patient registration, you can then make use of these entries. In this way you save time during data entry and avoid typing errors.



Possible selection lists

You can change and add to the selection lists for the following input fields if these fields are shown in the Patient Registration window:

- ❏ Referring physician
- ❏ Admitting diagnosis
- ❏ Ward
- ❏ Institution name
- ❏ Performing physician
- ❏ Operator

Creating entries

You can create up to 50 entries for each selection list.

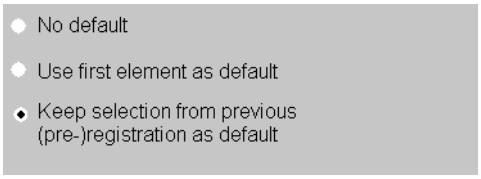
- Under **Entering Data**, select which selection list you want to edit.
- Enter new entries in the text input field below and correct or delete the existing entries.

Dr. Winter
Prof. Schwarzmann

The entries are automatically sorted in alphabetical order.

Defining default entries

For each selection list you can define whether and which entries are preselected in an input field when you call up patient registration.



- Select **No default**.
  – When you call up patient registration, the input field is empty.

Or

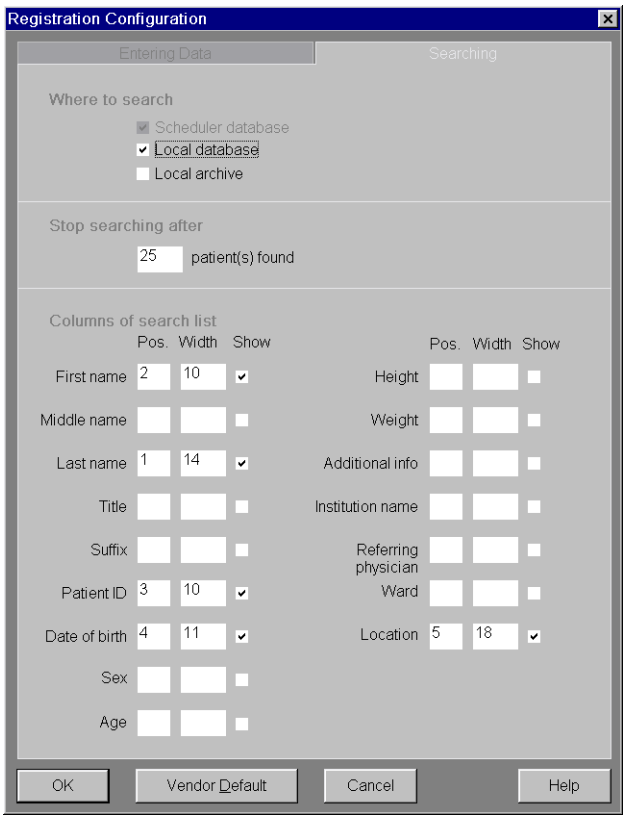
- Select **Use first element as default**.
  – When you call up patient registration, the first entry from the selection list is already in the input field.

Or

- Select **Keep selection from previous (pre-)registration as default**.
  – When you call up patient registration, the entry you selected for the last patient you (pre-)registered is already in the input field.

Configuring Patient Search

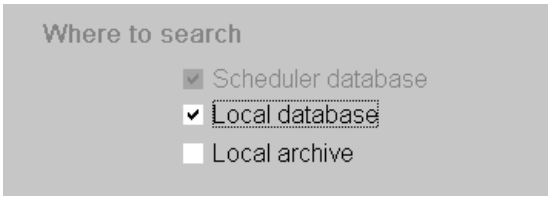
In the **Searching** tab card you can define which databases are to be searched during a patient search, after how many hits the search is terminated, and what information the search list is to contain.



Specifying databases

During a patient search the following databases can be searched:

- ❏ Scheduler database
  (contains all patients preregistered at your system)
- ❏ Local database
  (contains all patients who were examined at your system in the past and whose data have not yet been deleted)
- ❏ Local archive
  (contains all patients that are stored on the data media currently inserted)



◆ Select the databases that you want to search during the patient search.

It is not possible to exclude the scheduler from the search.

Limiting the number of patients found

You can have the search stopped once a certain number of patients have been found.

◆ Enter after how many hits you want the patient search to be stopped.

Defining the display of the search list

Here you can select which data items of the patients found will be listed in the **Patient Search** window and how the display is to appear.

You can have the following information displayed:

- ❏ Personal data
  You can have some or all of the information that you have entered in the **PATIENT** area displayed in the search list.
- ❏ Admission data
  Information about the referring physician and ward from the **HOSPITAL** area.
- ❏ Information about the hospital/practice
  The name of the hospital/practice that you have entered in the **INSTITUTION** area.
- ❏ Location
  The network node where the data of the patient displayed in the search list are stored.

◆ Enter the column of the search list in which the information is to be entered.

◆ Enter the column width (number of characters).

◆ Click the information that you want to display.

Introduction to the Patient Browser

The **Patient Browser** supports you in the administration of patient and examination data stored in the databases of your system.

With the **Patient Browser** you can search for data fast and easily and then process the data in the browser or in the task cards.

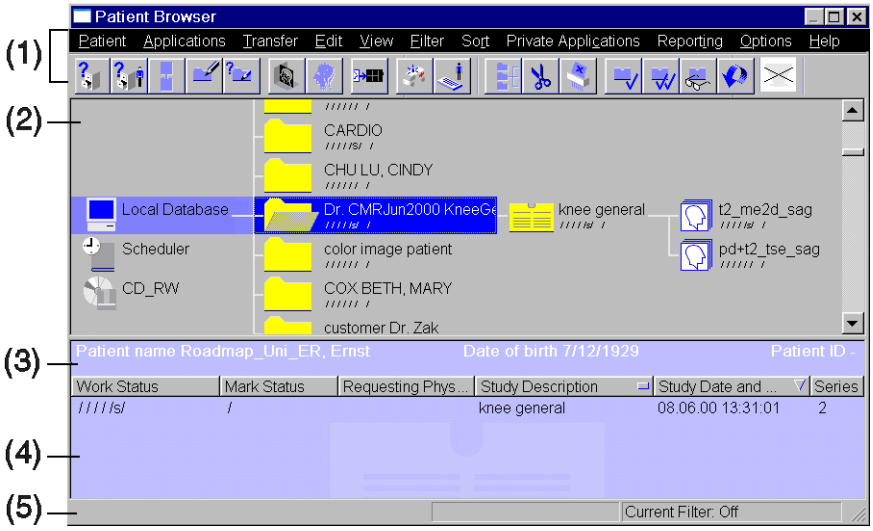
When to use the Patient Browser

- ❏ To examine a patient who has already been examined once before with your system and whose data are still saved in the local database.
- ❏ To view the images of a patient from earlier examinations in order to compare them with current results.
- ❏ To comment or postprocess images after an examination.
- ❏ To correct incorrect information on a patient stored in your system.
- ❏ To archive patient and examination data or to send them to another location in your hospital via the network.
- ❏ To expose images of a patient onto film for reporting or documentation purposes.

The Patient Browser window

When you call up the **Patient Browser**, the **Patient Browser** window is displayed and placed in the foreground.

The window is subdivided into various processing areas and therefore provides you with access to your data in a clearly laid out manner.



(1) Menu and tool bar

(2) Navigation area

(3) Information area

(4) Content area

(5) Status bar

Tool bar You can edit the data you have selected using the menus or the icon buttons on the tool bar.

Navigation area The lower data levels for the selected databases, patients, studies and series are displayed graphically in the navigation area.

Information area In the information area you can see brief information about the patient and study selected.

Content area The content area contains a list of the studies or procedure steps for the patient selected in the navigation area. If you select the lower data levels, you can see which series or procedure steps are stored for a study and which images or action items are stored for a series or procedure step.

Databases and drives

In the **Patient Browser** you can access patient and examination data stored in the different databases of your system or on external data media such as CDs.

Local database

The local database is the area of your system where patient data and results of current examinations are stored.

As the data volume in the local database increases, access times become longer and examinations are slowed down. Therefore you should regularly move data from your local database to archive media.

If patient data are saved only locally, they will no longer be available once they have been deleted. If follow up studies need to be performed, the patient must be registered again.

If you have saved the data in an archive on the network, they will still be available even after the patient has been deleted from the local database.

Scheduler

The scheduler contains the data of all preregistered patients. This database gives you an overview of all patients who have been preregistered for examination. Here you can search for patients you want to register for an examination.

If available, the **HIS/RIS worklist** is displayed in the scheduler.

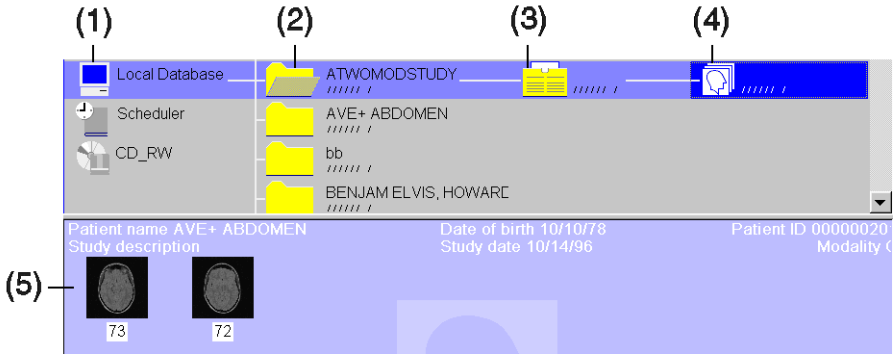
The **Clear Scheduler** *function allows you to delete certain scheduler entries in one step.*
(→ Page 50)

Connected drives

One or more CD drives are connected to your system. The icons with the drive names provide a quick way of accessing these archive media. As soon as an examination has been completed and evaluated, you should archive the examination data and then delete them from the local database.

Data levels

In the databases and on the external data media, the patient and examination data are structured hierarchically. This structure helps you find examination results quickly.



(1) Database

(2) Patient

(3) Study

(4) Series

(5) Images

The display of the data levels depends on the configuration.

Searching for and displaying patient data

In the **Patient Browser** window you can view all the patient and examination data stored in the databases of your system or in the main databases of other network nodes (if connected) and on external archive media.

Calling up the Patient Browser

You can call up the **Patient Browser** window either from the main menu or by using the symbol keypad.

- Press the **Patient Browser** key on the symbol keypad.

Or

- Call up the **Patient Browser** in the main menu by selecting **Patient > Patient Browser**.

Data at the workstation

You can search for patient data in the Patient Browser by navigating through the data levels of the window by mouse click or using the keyboard.

You can speed up your search by sorting the data displayed, e.g. alphabetically by the last name of the patient. You can also filter the data displayed and only view a certain subset.

Opening a data level

To select certain images of a patient for processing, you can open the information levels patient, study, and series one after the other until the images you require are listed or displayed (as image stamps) in the information area.

- Click on individual data objects in the navigation area to open all the associated entries of lower data levels.

Filtering data

When filtering your data you can use filter criteria that are offered by default by your system. These are available to you on the menu bar or with the buttons on the tool bar.

Using the **Patient Browser** *you can also create your own filter criteria in order to filter the database according to a combination of target items. You can call up the* **Filter Specification** *window with* **Options > Filter Settings**.

Activating a filter

- Select one of the filter criteria in the **Filter** menu of the **Patient Browser**.

Or

- Select a standard filter from the **Tool Pool**.

In the **Browser Configuration** *dialog you can define which filter icons are displayed on the tool bar. To display this dialog box, select* **Options > Configuration**. (→ Page 51)

Deactivating the filter

- Call up **Filter > Off**.

Or

- Click on the icon button to have all the data displayed again (unfiltered).

Sorting data

You can sort the data displayed in the Patient Browser by various criteria. This enables you to output the data in a certain sequence and makes it easier to find certain patient and examination data.

- Select a data level in the navigation area.
- Open the **Sort** menu.

Depending on the data level displayed in the content area, different sorting criteria will be provided.

- Click on one of the sorting criteria offered.

Data on external exchange media

You can import patient and examination data archived or exported onto a data medium in DICOM format into your system (into the local database) if a drive has been installed and configured appropriately.

Importing data

- Insert the required data medium.

- Click on the icon of a data medium in the navigation area.
- Select the required patient data from the data medium in the navigation area.
- Call up **Transfer > Import**.

— Or —

- Click the icon button on the tool bar.
- Call up **Transfer > Eject from...** to remove the data medium.

Data in the network

Patient and examination data stored on other workstations or in a long-term archive can be accessed via **Patient Search**. Import the required data into your local database via the network so you can process and evaluate them on your workstation.

Calling up Patient Search

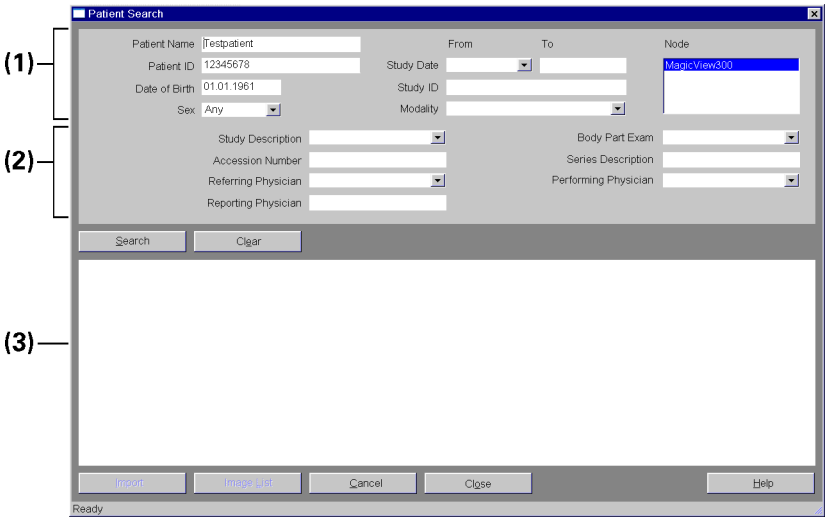
◆ Call up **Patient > Search**.

— Or —

◆ Click the icon button on the tool bar.

If you need further data on a patient stored in your local database, select the patient in the **Patient Browser** *and call up* **Patient > Search Selected**. *The search window will then already contain the search mask for the relevant patient.*

– The **Search** dialog box is displayed.



(1) Input fields for search criteria (search mask)

(2) List of search details

(3) Display of search results

Starting a search

◆ Enter the known patient data and further search details, if necessary.

Unknown data can be replaced by the wildcard "", e.g. T*.*

◆ In the **Node** field, specify the network node where you want to search for the data.

◆ Start the search by clicking the **Search** button.
– The patients, studies and series found are displayed in the results area of the **Search** dialog box.

To display a list of all images of a series selected in the results area, click the **Image List** *button.*

Importing data

Caution

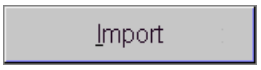
Receipt of images of a patient listed under different personal data in the local data and on the sending network node (e.g. after patient was renamed on the network node).

Possible loss of data since the images are assigned to the patient with the original personal data in the local database.

◆ In this case, search for the imported data with the **Patient Browser** using suitable search and filter criteria.

◆ If necessary, correct the personal data of the patient concerned in your local database.

◆ Select the required data in the results area (or in the image list).



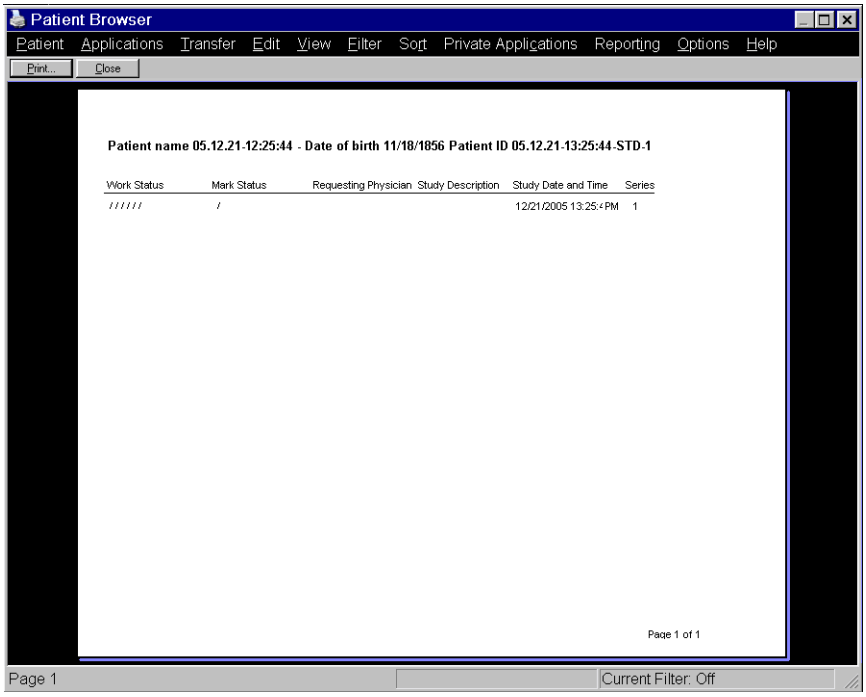
◆ Click the **Import** button.
– The selected data are copied from the network node to your workstation and displayed in the navigation and content area of the **Patient Browser**.

Printing a data list

If a printer is connected, you can print a list of examination data. When printing data, the information displayed in the content area is processed.

Displaying a print preview

- Display the required patient and examination data in the content area.
- Select **Patient > Print Preview**.
  – A print preview of the data list is displayed.


Patient Browser
Patient Applications Transfer Edit View Filter Sort Private Applications Reporting Options Help
Print... Close
Patient name 05.12.21-12:25:44 - Date of birth 11/18/1856 Patient ID 05.12.21-13:25:44-STD-1
Work Status Mark Status Requesting Physician Study Description Study Date and Time Series
/////// / 12/21/2005 13:25:4 PM 1
Page 1 of 1
Page 1
Current Filter: Off

Printing

- Select **Patient > Print List**.

— Or —

- Click **Print** in the **Print Preview**.
  – The data list is printed on the default printer.

If you wish to print on another printer, select **Patient > Print**. *You can now change the print settings in the dialog box displayed.*

Updating and deleting data

Every now and then it is necessary to add or correct patient data or information relating to the study of a patient (e.g. emergency patient). You use the **Patient Browser** to search for the patient in the database and to edit the corresponding data.

With the DICOM MPPS option the system automatically generates a performance report for each examination which you complete and terminate after the examination and postprocessing.

Once the examination data have been successfully archived and are no longer needed, you can delete them from the local database.

Please note that when deleting large amounts of data part of the system resources will be occupied for a while (up to 30 minutes for deleting all data with completely filled database). During this time the system performance during examinations with high image storage rates may be restricted.

To avoid interfering with routine clinical procedures, we recommend that updates, deletion and archiving of data be performed during times when the mobile C-arm system is not used.

Changing patient or examination data

The described functions for changing patient and examination data are used for correcting the local database.

Possible changes

You have the following possibilities of changing data:

- ❏ Correcting data in the **Correct** dialog box.
- ❏ Rearranging patient data in the **Patient Browser**.

External data

If you change a data set that has also been sent to another network node, please note the following: The changes only affect the local database. The corresponding data set is not automatically updated on other network nodes. This can lead to inconsistencies between the local data set and the exported data set.

You have two possibilities to avoid these inconsistencies:

❏ Besides the local data set, you also correct all relevant data sets on other network nodes.

❏ You delete all relevant data sets on other network nodes and resend the corrected data sets.

Safety notes for changing data

When correcting and rearranging examination data, make sure that the images are assigned correctly and these changes are also made on the other network nodes.

Caution

Correcting/rearranging objects with references.

References may be lost.

◆ Rearrange the entire hierarchical group containing all objects with references in order to maintain the references.

Caution

Rearranging of series/images into another series may lead to wrong image information, if the selected images/series are not compatible.

Wrong diagnosis due to incorrect image information.

◆ Correct the attributes which do not correspond before you rearrange the series/images.

Please terminate the active study of the patient before correcting examination data of this patient.

Correcting data

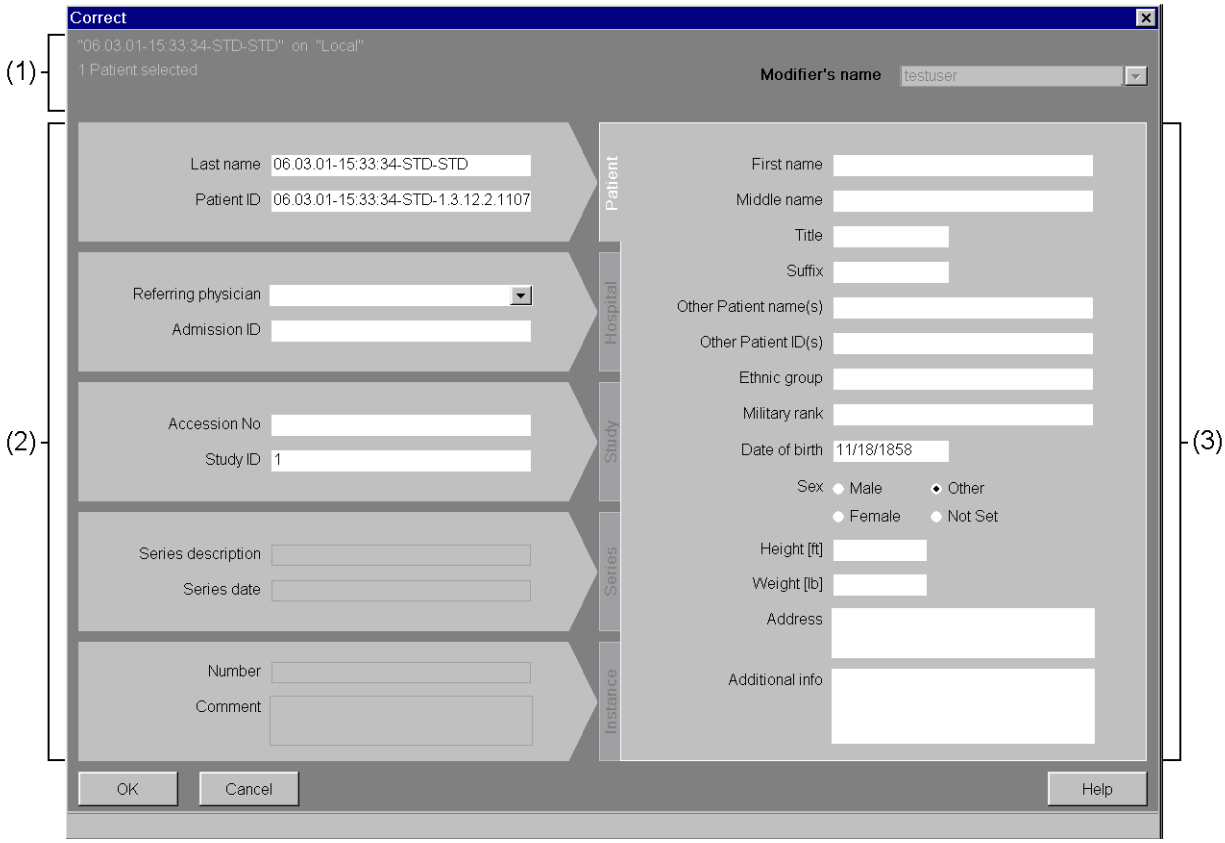
Patient and examination data can be changed and added to in the **Correct** dialog box.

Calling up the Correct dialog box

- Select the patient, study, series or images that you want to correct in the navigation or content area of the **Patient Browser**.
- Call up **Edit > Correct**.

— Or —

- Click on the icon button on the tool bar.
  – The **Correct** dialog box opens.



(1) Name and number of selected data

(2) Entry form for correction data, divided into data areas

(3) Entry cards for details of the individual data

Entering data

In the input and selection fields of the **Correct** window you can see the information that has been stored for the selected patient or selected study or series so far.

◆ Correct or add to the selected data.

Depending on the data level in which you want to correct data, some fields of the **Correct** *dialog box might be dimmed. Data marked by "*" cannot be changed.*

When you enter very long comments in the **Comment** *input field, only the first part of the text is displayed in the* **Viewing** *task depending on the selected layout. A third or fourth comment line is not displayed either.*

Signing for changes

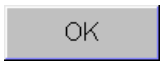
◆ Enter your name under **Modifier's Name**.

Or

◆ Select your name in the selection list.

If you do not specify a name, the name with which you logged on to the system is taken as the modifier.

Saving changes



◆ Click **OK**.
– The new data are saved and the changes are included in the history of changes.

Merging patient data

A patient whose name was spelt incorrectly during an examination or who was once registered as an emergency patient is stored in the database twice.

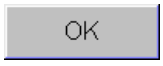
As soon as you save the corrected patient name, the dialog box asks you whether you want to merge the examination data of the two patient entries.

Caution

Patient data are merged.

Examination data may be assigned to the wrong patient.

- Before confirming the message, make sure that the patient is one and the same.



- Click **OK**.
  – All selected data are stored under the corrected patient name.

Or

- Click **Cancel**.
  – The correction of the data is canceled. No changes are made.

Rearranging data

The study images of a patient are sorted hierarchically by series and studies. If required, you can change this assignment in the **Patient Browser**.

Data can be rearranged only within a patient entry.

The following restrictions apply for rearranging data:

- ❏ Only images of the same application area that were acquired in the same patient position can be merged.
- ❏ The data hierarchy must be maintained, e.g. a study cannot be subordinated to a series.
- ❏ Delete-protected data or data currently loaded in an application cannot be edited.

Moving data

- ◆ Select the study, series or images in the **Patient Browser**.
- ◆ Move the selected data to the required position by drag & drop.
  – The **Rearrange** dialog box for confirming your changes is displayed.

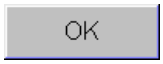
Signing for changes

- ◆ Enter your name under **Modifier's Name**.

Or

- ◆ Select your name in the selection list.

If you do not specify a name, the name with which you logged on to the system is taken as the modifier.



- ◆ Click **OK**.
  – The changes are saved and included in the history of changes.

History of changes

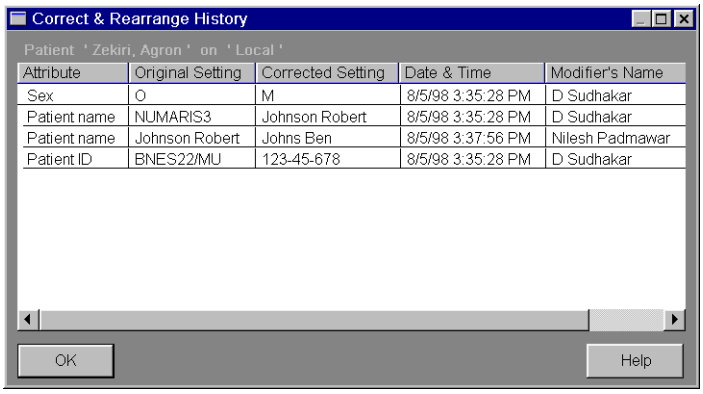
The history of changes is a type of logbook of your local database that is created separately for each data level. Here you can always see what changes and additions have been made to the data of a patient and to the information about the patient's examinations.

Opening the history of changes

- Select the patient, study, series or image stored in the local database whose history of changes you want to view.
- Call up **Edit > History**.

Or

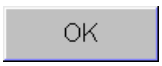
- Click the icon button on the tool bar.
  - The **Correct & Rearrange History** window is displayed with a chronological list of changes.



Depending on the hierarchy level of the selected data, different information is listed in the **Correct & Rearrange History** *window.*

If an object has been moved, the entry is marked with ">" under Attribute in the **Correct & Rearrange History** *window.*

Closing the history



- Click **OK**.
  - The history display is closed.

Changing the work status

The work status indicates the processing stage of patient and examination data. This status is indicated as an abbreviation in every list entry in the content area. All work statuses with the exception of "rea" and "ver" are automatically set by the system.

Under Transfer Configuration you can specify that data must have reached a certain work status before they can be archived and sent.

Entering the status manually

As the user you can set the following entries for studies and series in your local database:

- ❏ com/... Completed
- ❏ ver/... QA Verified
- ❏ rea/... Read

◆ Select **Edit > Set State** and select the work status you want to assign.

Or

◆ Click the appropriate button on the tool bar.
– The work status of the selected data objects is changed correspondingly.

Performance Documentation (MPPS)

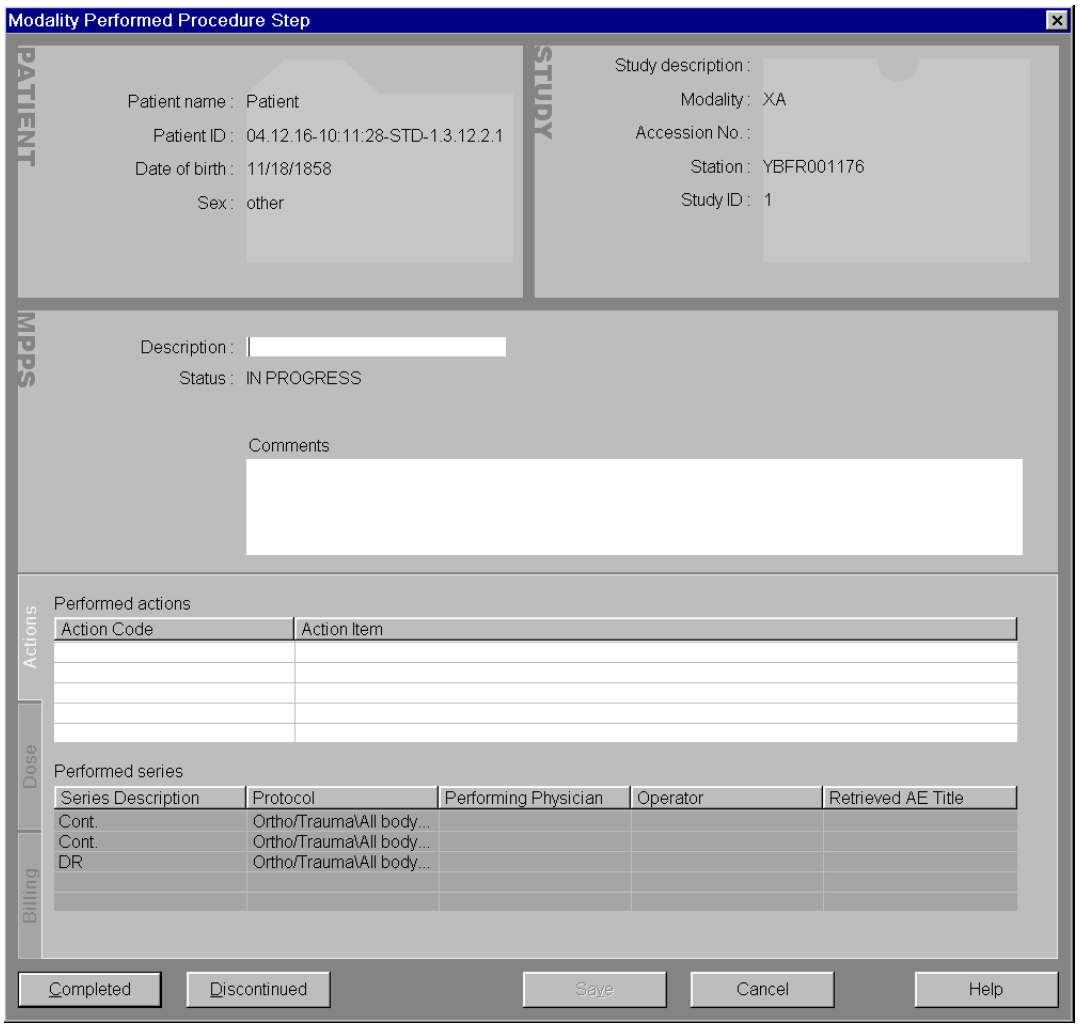
If the DICOM MPPS option is installed, your system creates a performance report during patient registration. During examination and postprocessing of the examination results, the report is updated.

Before you conclude your work on the examination by archiving, check the performance report and add any missing entries.

- Select the patient, the examination, or one of the associated series or images from the **Patient Browser**.
- Call up **Patient > Show MPPS**.

Or

- Click the icon button on the tool bar.
  – The **Modality Performed Procedure Step** window is displayed.



Adding data

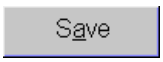
- Enter a comment and a short description in the **MPPS** area, if necessary.
- Enter all performed actions in the table on the **Actions** card.
- Click the **MPPS** card in the foreground and enter all action steps, the film consumption and the material into the tables.
- If you want to annotate the applied radiation dose, click the **Dose** card in the foreground and enter the text into the lower **Comment** field.

Sending and concluding a report

If all data in the performance report are entered correctly, you can close the report and therefore also the examination. If further procedure steps are planned, you can save the report temporarily and conclude it later.

Depending on operational requirements, you can pass the report on to the HIS/RIS system.

Saving a report



- Click the **Save** button.

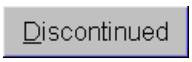
Your entries are saved to the report and the **Modality Performed Procedure Step** window is closed.

Concluding a report

◆ Click the **Completed** button to conclude the report and the examination.
– The report and the examination are concluded.

A message indicating this is sent to the HIS/RIS system, if connected. You can no longer make changes to the performance report.

Exiting a report as discontinued



◆ Click the **Discontinued** button.
– The examination will not be continued.

The report is also closed with that. A message indicating this is sent to the HIS/RIS system, if connected.

Deleting data

If an examination has been completed and all the examination results and images have been reviewed and comments have been added, you can archive the data and then delete them from the database.
(→ Register Filming/Printing and Archiving, Page 61 and Page 65)

Deleting patient data

You can delete existing data in the navigation or content area.

Caution

Deleting non-archived images

Data are irretrievably lost

- Before deleting images, make sure that these have been archived correctly.

- Select the data you want to delete.
- Call up **Edit > Delete** in the main menu of the **Patient Browser**.

Or

- Click on the icon button on the tool bar.
  – A dialog box is displayed in which you have to confirm again that you really want to delete the selected data.

Protecting data from deletion

You can protect patient and examination data from accidental deletion.

- Select the data that you want to protect against deletion in the navigation or content area.
- Call up **Edit > Protected** in the main menu of the **Patient Browser**.

Or

- Click on the icon button on the tool bar.
  - You can now no longer simply delete the selected data. Delete protection always includes all lower data levels and the related entries of the higher data levels. For example, if you protect a study entry you can no longer delete the individual images of that study nor the patient entry.
  - Delete protection can be identified by the mark status "prot".

Data that have been delete-protected are also protected against being moved and corrected.

Removing delete protection

If you want to correct, move or delete data without a message box being displayed, you must remove the delete protection again.

- Call up **Edit > Remove Protection** in the main menu.

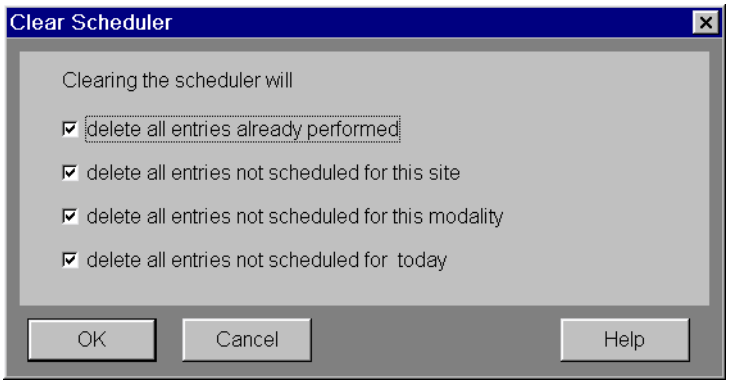
Or

- Click on the icon button on the tool bar.
  - Delete protection is removed.

Deleting data in the scheduler

The **Clear Scheduler** function allows you to delete certain scheduler entries in one step.

- Select **Edit > Clear Scheduler** in the menu bar of the **Patient Browser**.
  – The **Clear Scheduler** dialog box is displayed.


Clear Scheduler
Clearing the scheduler will
delete all entries already performed
delete all entries not scheduled for this site
delete all entries not scheduled for this modality
delete all entries not scheduled for today
OK
Cancel
Help

- Select the entries to be deleted by ticking the relevant check boxes.
- Confirm your selection with **OK** to save your settings and delete the corresponding procedure steps.

Patient Browser configuration

With the **Browser Configuration** dialog box you can adapt the **Patient Browser** to your method of working.

You can change the following settings:

- ❏ General settings such as the layout of the tool bar, the display of the work status and the link to individual network nodes (in preparation).
- ❏ The hierarchical view of the information levels (patient, study, series, instance) in the navigation and content area.
- ❏ The display of the individual information levels (study, series, instance) in the content area.
- ❏ The selection lists in the **Patient Search** window.

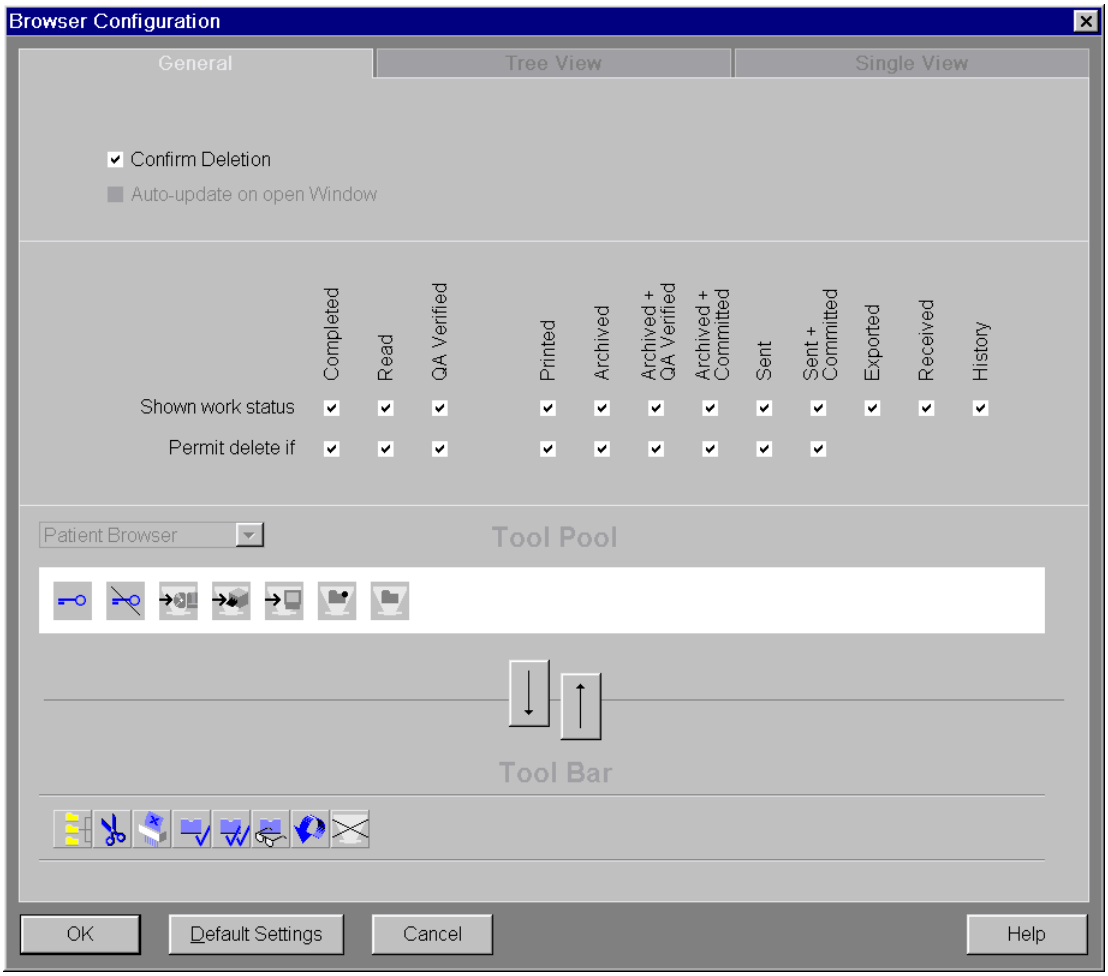
Calling up the configuration window

You can call up the configuration window from the syngo Configuration Panel.

- ◆ Select **Options > Configuration** in the main menu.
- ◆ Double-click on the **Patient Browser** icon.
  – The **Browser Configuration** window with the tab cards **General**, **Tree View** and **Single View** is displayed.

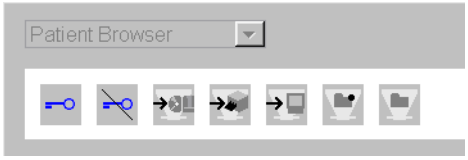
General settings

On the **General** tab card you can configure the tool bar of the **Patient Browser**, define which work status is displayed for the examination data, and set the influence of the work status on delete permission. And finally, here you can establish the links to network nodes.



Configuring the tool bar

You can place buttons for the functions of the **Patient Browser** that you require frequently on the tool bar and remove rarely used functions.



- Select an action that you want to place as an icon button on the tool bar from the **Tool Pool**.
- Click the **Down arrow** button.
  – The selected button is displayed in the **Tool Bar**.

- Repeat this step until the **Tool Bar** contains all the buttons you require.

Deselect the buttons that you do not require using the **Up arrow** *button.*

Work status

In the middle part of the **General** tab card you can define which work status of the examination data is displayed in the content area and in which processing state data is released for deletion.

Showing work status

- Select the check box for a work status if you want this work status to be displayed in the content area of the **Patient Browser**.

Defining delete permission

- Select the check box of a work status.
  – Data without this status cannot be deleted without explicit confirmation in a message box.

Delete confirmation

The default setting is to have your system display a confirmation window before each deletion even if the data concerned have already reached the work status required for deletion. You can activate and deactivate this confirmation in the configuration.

Caution

Delete confirmation has been deactivated

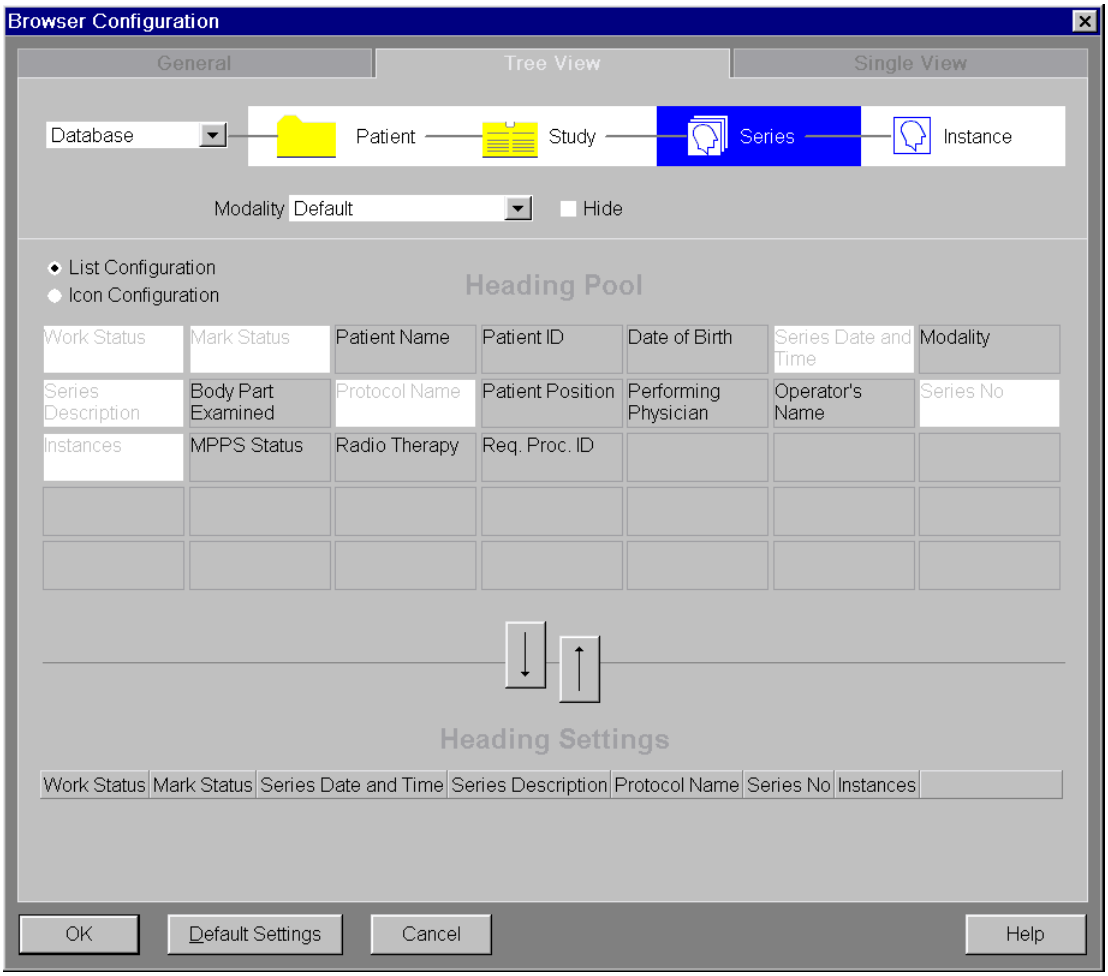
Loss of data possible

- Delete confirmation should always be activated.

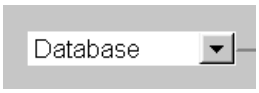
- Click the **Delete Confirmation** check box.
  – A confirmation box is displayed every time before data is deleted.

Tree view

On the **Tree View** tab card you can define what information is listed in the content area of the **Patient Browser** in the hierarchy levels (e.g. patient). You can also hide hierarchy levels in the navigation and content areas and configure the icon display of series and images.



Selecting a database and a data level



◆ Select **Database**.
– The local database view is configured.

Or

◆ Select **Scheduler**.
– The display of preregistered patient data is defined in the **Patient Browser**.

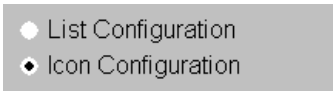
◆ Select the data level for which you want to define the entries.

The names and information that appear on the Tree View card for the different data levels differ depending on the database that you have called up (e.g. **Study** *in the local database corresponds to* **Procedure** *in the scheduler).*

List entries

For the "Series" and "Instance" data levels you configure the display of the list and of the icons.

Selecting list/image stamp display



- Select the display option for which you want to define the entries.

Making entries

- In the **Heading Pool** select which entries you want to have displayed in the content area.

Select the entries in the sequence in which you want to have them displayed in the table.

- Click on the **Down arrow** to place the entry in the **Heading Settings** for the table in the content area.

Using the **Modality** *selection list, you can define the entries depending on the imaging modality or the data type.*

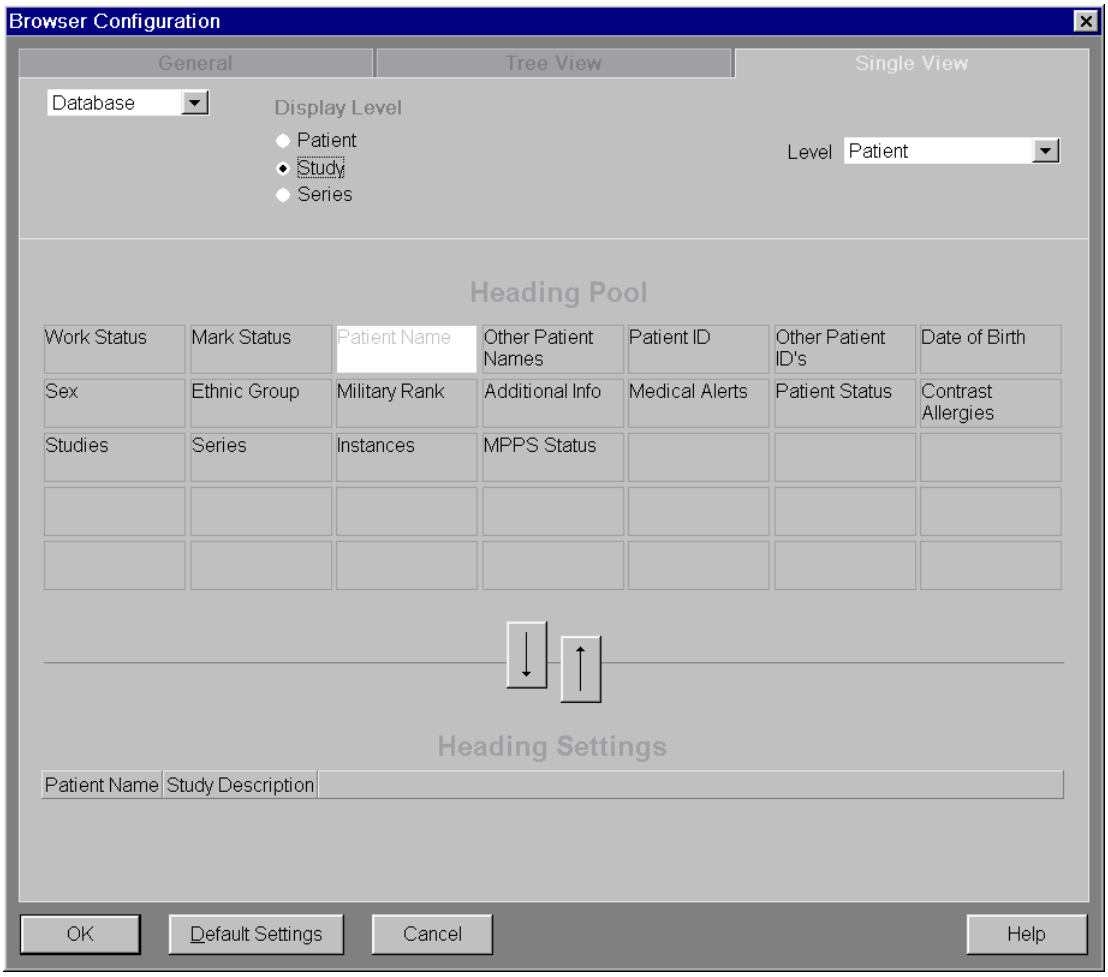
Hiding data levels

You can define whether the examination, series, or instance hierarchy levels are displayed in the navigation and content area.

- Click the **Hide** check box to hide this data level.

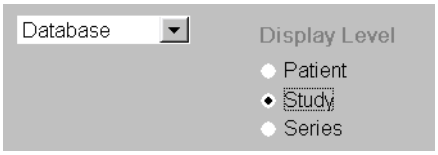
Single view

In the **Single View** card you can define up to which hierarchy level data are to be displayed if the navigation area is hidden. Each data entry is displayed in exactly one line.



Selecting a database and a data level

- Select the database that you want to configure from the selection list.



- With the **Display Level** radio button you can select the data level that you want to have displayed when switching from **Tree View** to **Single View** in the content area.

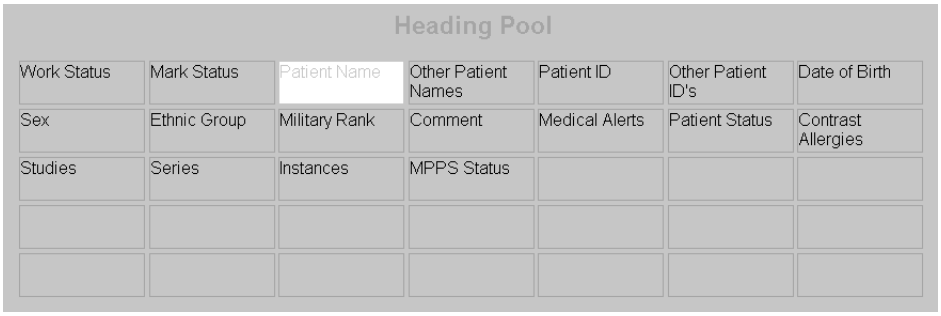
In single view, the content area always shows the same data level.

List entries

You can combine list entries of different information levels by varying the data level for the pool in the Heading Pool from which you then select the required entries.

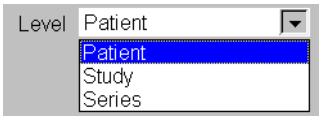
Defining data entries for Heading Pool

- Define the data level in the selection list from which you want to take list entries for the content area in the **Heading Pool**.
  - In the **Heading Pool** all the possible list entries from the selected information level are displayed. The currently selected list entries are highlighted.



Making entries

- Click on a list entry in the Heading Pool and move it into the **Heading Settings** with the down arrow button.



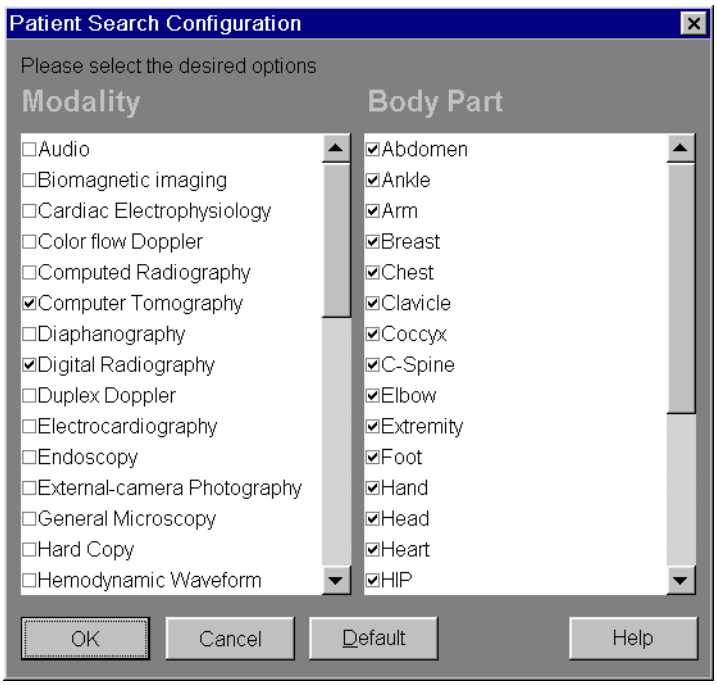
- Now select another **Level**, if necessary, to place list entries of another data level from the **Heading Pool** into the **Heading Settings**.

Configuring Patient Search

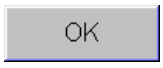
You can adapt the user interface of the **Search** dialog window to your method of working. The dropdown lists of the search criteria **Modality** and **Body Part** are configurable.

- Call up the syngo **Configuration Panel** by activating **Options > Configuration** in the main menu.

- Double-click the **Patient Search** icon.
  – The **Patient Search Configuration** window appears.



- Select or deselect the desired items by clicking or deselecting the corresponding check box.



- Click the **OK** button.
  – The settings you have made are saved.

SIEMENS

Operator Manual
ARCADIS Orbic

Examination

SP

SPR2-320.620.01.02.02

Please observe the

Safety register

This must be studied thoroughly before system startup.

The original version of this manual was written in the German language.

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SP

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Safety information relating to the examination procedure

Prior to the examination

Warning

Incorrect image position displayed on the monitor

Operative intervention at the wrong position

- Use lead letter as orientation aids during the exposure.

Integrated I.I. laser aimer

Depending on the configuration of your ARCADIS Orbic, you can use the integrated I.I. laser aimer for positioning the patient.

Warning

Laser radiation

Danger of eye injury

- Do not view the beam using optical instruments (laser class 1M).

Examination settings

Before starting surgery, please make sure that all the set parameters as well as examination settings in all operation modes are correct.

Software failure

In the event of a software failure the ARCADIS Orbic can be restarted.

Storage capacity

The hard disk usage is displayed in the status bar of the left monitor. A warning signal is displayed before the final capacity of the hard disk is reached.

This icon, for instance, indicates that about 10 percent of the disk space is used.

Please make sure that there is sufficient storage capacity before you start the examination. In addition, please note the relevant system messages.

Reference images from previous examinations

Since permanent network functionality cannot always be guaranteed, reference images should be loaded from the network archive before starting an examination.

During the examination

Prior to releasing radiation, make sure the patient is positioned correctly.

Ensure correct image orientation (accurate to side) on the monitor and/or film.

Before saving images, check that image and patient data are assigned correctly.

Verify the patient data before terminating an examination and beginning work on the next patient.

At the end of the examination, deselect the registered patient.
(→ Page 18)

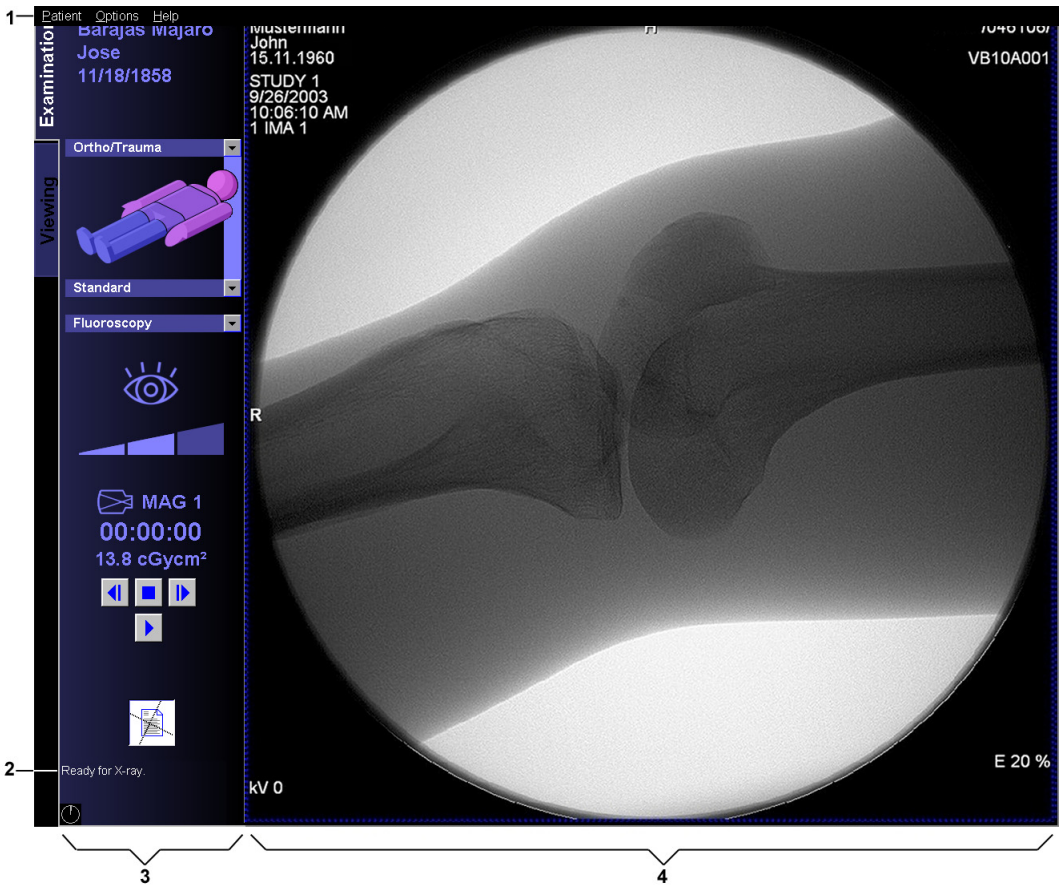
If the exam set used is configured such that all images are saved, you must limit the series length to less than 1000 images.

Examination task card

The **Examination** task card is used for setting and displaying examination-related operating and program parameters. It is also used for acquiring images and displaying current images and examination data.

Layout of the Examination task card

The task card is displayed on the left monitor, the so-called live monitor:



(1) Menu bar

(2) Status bar

(3) Control area

(4) Image area

Elements of the Examination task card

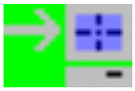
Menu bar

The user can access various functions using the menu bar. It opens when the mouse cursor is moved to the upper edge of the monitor.

Status bar

System messages indicating the current state of the system or error messages are displayed in the lower part of the control area.

NaviLink 2D



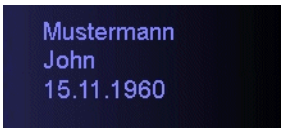
If the **NaviLink 2D** option is available in the system and communication between the navigation system and the C-arm is activated, you can see the **NaviLink 2D** icon in the status bar of the **Examination** task card.

The navigation system sends a message to the C-arm system signaling readiness for receiving images. The C-arm system receives the message, identifies the sending navigation system and replies. At this moment, communication between the two systems is activated and the **NaviLink 2D** icon appears in the status bar of the **Examination** task card. As soon as the communication connection is terminated, the **NaviLink 2D** icon disappears again.

Control area

The control area shows the following:

- ❏ Information about the current patient
- ❏ Examination settings
- ❏ The current state of the ARCADIS Orbic

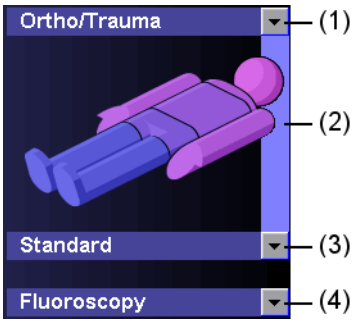


Patient data

The registered patient's last name, first name and date of birth appear in the upper control area.

Selection area for examination settings

The selection area for examination settings offers several selection lists that can be opened by using arrow symbols.



(1) Selection list of medical application areas

(2) VPA (**V**irtual **P**atient **A**natomy) for selecting the body region

(3) Selection list of exam sets

(4) Selection list of operating modes

Radiation data

The different dose levels of the selected exam set are displayed in a progress bar.

Here, the entire fluoroscopic time since the start of the examination of a patient is displayed.

The cumulative area dose product for the current patient is displayed, if the optional dose measurement chamber is installed.

As an alternative: Display of air kerma values. The cumulated air kerma value is identified by a preceding dot.

Depending on country-specific regulations, you can have Siemens Service change the display so that it indicates the air kerma and cumulated air kerma value instead of the area dose product.

Image area

In the image area the fluoroscopic images are displayed during and after exposure.

Live images As soon as the exposure (i.e. the radiation) starts, the current fluoroscopic images (live images) are displayed in the image area of the **Examination** task card.

Last Image Hold (LIH) The last fluoro image (Last Image Hold) is displayed in the **Examination** task card as soon as the exposure is terminated.

Performing an examination

After you have registered the patient for the examination, the **Examination** task card appears automatically. Here you can check the default examination settings. If necessary, you can change the parameters in the selection area for the examination settings in the control area.

Individual exposures are released directly at the C-arm system with the hand switch or footswitch.

If you x-ray a patient without having registered him/her, this patient will have the status of an emergency patient in the local database.

Examination settings

In the **Examination** task card, standard exposure parameters for **Ortho/Trauma** applications are already preset. If these settings are appropriate for your examination, you can start the acquisition immediately at the ARCADIS Orbic.

If, however, you want to optimize the examination settings according to your medical indication, simply call up the required parameters by using the corresponding selection lists.

How to proceed

The different examination settings are divided into different parameters sets that are structured hierarchically. The sequence of the associated selection fields in the **Examination** task card corresponds exactly to this hierarchy. Therefore, when defining the desired settings, you simply proceed from top to bottom in the control area:

1. Selection of the medical application field
2. Selection of the body region to be examined
3. Selection of the exam set (thereby setting the dose)
4. Selection of the operating mode (thereby loading the parameters settings of the associated operating program)

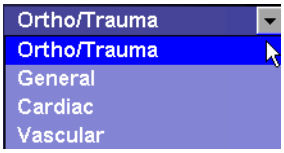
Medical application field

First select the intended medical application field.

You can configure which application field is automatically selected after patient registration.

Each medical application field is assigned a specific standard program. As soon as the application field is activated, you can perform an X-ray examination right away.

Selecting the application field



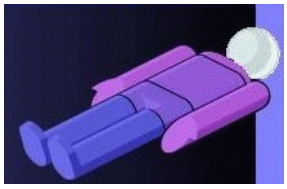
- Select the required medical application field for your examination in the selection list.

Body region

If you want to x-ray a specific body region within an application field, several exam sets adapted especially to this particular body region are at your disposal. They can be selected using the VPA (**V**irtual **P**atient **A**natomy).

If no body region is selected, the standard program for the selected application field is activated.

Selecting a body region

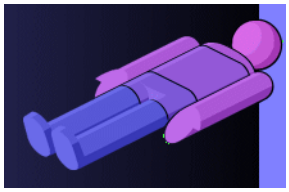


- Click on the body region that you want to examine.
  – The activated body region is highlighted in a light color.

Deactivating the selected body region

- Click on another body region that you want to examine.

— Or —



- Click in the area outside of all body regions.
  – The deactivated body region is displayed in the original color.

Exam set

Three different dose programs are available for each selectable body region. These programs are contained in the operating mode settings.

When a body region is selected, the **Standard Dose** program is activated by default:

Modifying the dose

Usually a dose rate deviating from the standard setting is reasonable only if you have to adapt the dose to the particular anatomical conditions of the patient (e.g. very slim or obese patients).

- Use the selection list to select another exam set (dose program), if necessary.
  – With **Reduced Dose** you set the minimum dose rate, which still provides satisfactory image quality for the selected body region.

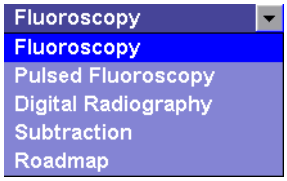
If you change the exam set, the fluoroscopy mode is automatically set.

If a different LUT is stored with the new exam set, the display of the current image changes (LIH).

Operating mode

The different operating modes are defined in each examination set. They can be activated at the monitor trolley as well as on the C-arm system. The default setting is **Fluoroscopy**:

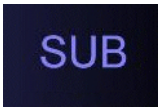
Switching the operating mode



- Use the selection list to select another operating mode, if necessary.

Or

- Press the corresponding icon button at the C-arm.
  (→ Register System Description)
  – The selected operating mode is displayed as a symbol in the control area.

Standard	Symbol	Option	Symbol
Fluoroscopy		Roadmap	
Pulsed fluoroscopy		Subtraction	
Digital radiography			

The C-arm system is equipped with a footswitch, which you can also use to change the operating mode. According to the assignment of the footswitch, the display on the monitor changes if radiation is released using the footswitch.
(→ Register System Description)

In any case, the monitor always shows the currently used operating mode. If you briefly switch to another operating mode via the footswitch, the newly selected operating mode is also displayed on the monitor during the radiation phase.

Exposure

All further steps of the examination are performed at the C-arm system. For detailed information please read (→ Register System Description, Page 9).

Starting the exposure

◆ Release radiation with the hand switch or footswitch.
  – The current fluoro image is displayed on the left (live) monitor.

Saving and displaying images

Saving images

In the fluoroscopy and pulsed fluoroscopy modes images can be stored during the examination. Images that you later want to print on a local printer must be saved during the examination.

Frequent activation of the Save button during fluoroscopy can delay the storage process.

◆ Press this key on the control panel of the C-arm system.

– Or –

◆ Press this button on the hand switch.
  – The current image will be saved in the local database. All images saved in the course of an examination are stored as a series.
  – The stored image is displayed on the right (reference) monitor. (→ Page 23)

If the exam set used is configured such that all images are saved, the **Save Image** *button is inactive.*

Changing the image display

The control panel of the C-arm system provides basic tools for optimizing the image display of the Examination task card.

- Edge enhancement (4 levels).

- Selection of LUT steps on monitor A.

- Enlarging/reducing the image.

Reviewing and storing a scene

In the continuous fluoroscopy, pulsed fluoroscopy, subtraction and Roadmap modes, scenes can be reviewed and stored (Last Scene Hold) during the examination.

Reviewing a scene

As soon as the exposure is finished, buttons for controlling scene review are displayed in the control area of the Examination task card.

- Start

- Stop

- Previous/next frame

If **Autoloop** *is configured in the exam set used, review of the scene is started automatically at the end of the exposure.*

Storing the scene

Prerequisite: Scene review has been stopped.

- Select **Patient > Save LSH Scene** in the main menu.

– Or –

- Press function key **F9** on the keyboard.
  – The last 120 images are stored in the local database.
  – You can load the scene into the **Viewing** task card at any time and review it there.

If the exam set used is configured such that all images are saved, manual saving is not necessary and therefore not possible.

Completing the examination

After you have completed your exposures, the last acquired image is displayed on the left monitor. Now you finish the examination of the current patient.

If you want to examine the next patient immediately afterwards, you can register that patient straight away. In this case the examination of the current patient is automatically finished.

Ending the examination

- Select **Patient > End Examination** in the main menu.

— Or —

- Press function key **F4**.
  – The examination is concluded. Patient and examination data are deleted from the **Examination** card.
  – If the MPPS option is installed, the **Modality Performed Procedure Step** window for performance documentation is no automatically opened.
  (→ Register Patient Data, Page 45)

Examining the next patient

- Select **Patient > Register** in the main menu and register the next patient for the examination.
  – The examination of the previous patient is completed.
  – The data of the new patient are loaded into the **Examination** card.

Special examinations

The following optional operating modes require special procedures deviating from the standard examination:

- ❏ Digital subtraction angiography (SUB)
- ❏ Roadmap

Digital subtraction angiography (SUB)

During the examination, images without contrast medium (mask) are continuously subtracted digitally from images with contrast medium and displayed on the monitor. Depending on the contrast medium flow, they display the relevant vascular segment without superimposition in real time.

Progression

Digital subtraction angiography is divided into three phases:

- ❏ Phase A
  Time until the mask is completed (permanently defined)
- ❏ Phase B1
  Time from the "inject" display on the monitor until the contrast medium has reached the area to be examined.
- ❏ Phase B2
  Time of the actual exposure of the examination region

If Auto Save is activated in the configuration menu, you should enter the duration for phase B1 and the storage transfer rate for phases B1 and B2 in that menu. Thus the image memory is not overloaded with unnecessary images.
(→ Register Configuration, Page 17)

Landmark

In some cases it is useful to see the anatomy surrounding the contrast-filled blood vessels. This can be configured gradually prior to the examination using the Landmark function.
(→ Register Configuration, Page 17)

Performing subtraction angiography

Prerequisites: The patient to be examined has been registered.

- Make the necessary settings for the examination.
  (→ Page 11)

- Set the **Subtraction** mode in the **Examination** task card or by pressing the corresponding key on the control panel.
  – The symbol for the current operating mode, **Subtraction**, is displayed.
  – The LED of the **SUB** key lights up.
- Before starting the exposure, click on the **Native** tab on the right monitor.
  – The **Native** task card is placed in the foreground.
- Release radiation with the hand switch or with the assigned footswitch.
  – During the generation of the mask the native image is displayed on the right monitor.

- Inject the contrast medium as soon as the syringe symbol appears on the screen.

Keep the radiation release button pressed until the vessel is filled with contrast medium.

  – On the left monitor you can see the continuous filling of the blood vessel with contrast medium.
  – After radiation has been switched off, the left monitor shows a subtraction image with accumulated contrast medium (maximum fill image). The right monitor shows the image with the largest fill phase and anatomical background (native).

Roadmap

In the first step of the Roadmap examination, the max. fill image is created as a mask from a normal subtraction (phase A and phase B). If the Roadmap examination is performed right after a subtraction angiography, you can use the existing subtraction mask, thus eliminating the first step.

In the second step, the display of the vessel into which the catheter is to be positioned is superimposed by current fluoroscopic images (phase C).

Generating a new fill image

If there is no suitable subtraction mask (e.g. from a previous subtraction angiography), you have to generate a new fill image.

Prerequisites: The patient to be examined has been registered.

- Make the necessary settings for the examination.
  (→ Page 11)

- Set the **Roadmap** mode in the **Examination** task card or by pressing the corresponding key on the control panel.
  – The symbol for the current operating mode, **Roadmap**, is displayed.
  – The LED of the **ROADMAP** key lights up.
- Release radiation with the hand switch or with the assigned footswitch.
  – The live image is displayed on the left monitor.

- Inject the contrast medium as soon as the syringe symbol appears on the screen.

Keep the radiation release button pressed until the vessel is filled with contrast medium.

- Let go of the radiation release button.
  – Radiation is stopped.

Using the fill image from subtraction angiography

Prerequisites:

A subtraction angiography (SUB mode) has been performed. The subtraction image is displayed on the right monitor.

The symbol for an existing subtraction mask is shown in the control area.

- Press the ROADMAP key on the control panel *once*.
  – The operating mode is switched to **Roadmap**.
  – Now you can start positioning the catheter.

If you press the **ROADMAP** *key twice, the existing subtraction image is discarded. You will then have to regenerate the fill image.*

Positioning the catheter

- Release radiation with the hand switch or with the assigned footswitch.
  – The live image is displayed on the left monitor.
- Position the guide wire or the catheter under fluoroscopic control.
  – The right monitor shows the fluoroscopic image.
  – The left monitor shows the subtracted Roadmap image with catheter.

You can repeat fluoroscopy as often as needed while you insert the catheter.

If you select **Roadmap** *again, start a new Roadmap scene.*

References task card

The imaging system uses two monitors for image display.

- ❏ The left monitor is used to display live images as well as preoperative and postoperative images. It contains the **Examination** and **Viewing** task cards.
- ❏ The right monitor is used to display reference images and contains the **References**, **Native** (for the **Subtraction** option), and **Filming** (option) task cards.

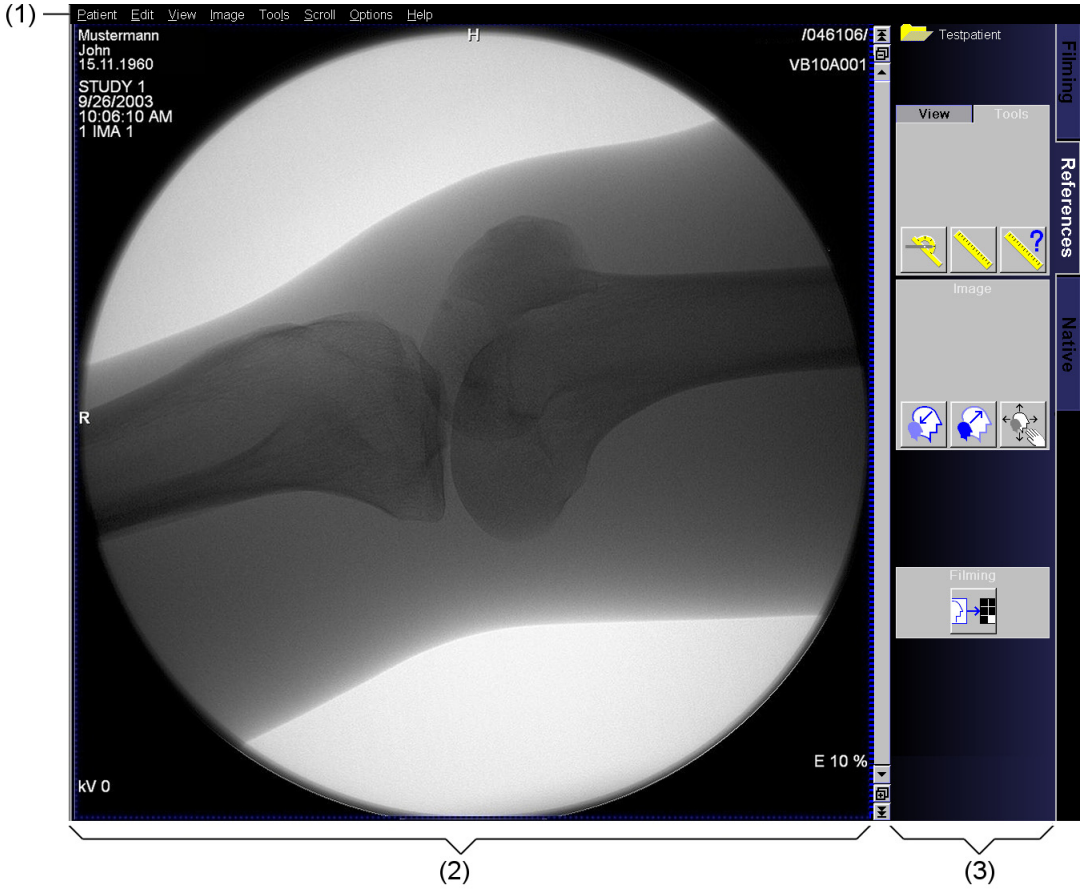
Reference images

The **References** task card is used to display specific images during an examination.

Reference images may be:

- ❏ preoperative images, incl. images of other modalities (e.g. CT, MR)
- ❏ images of current examinations
- ❏ images from previous examinations

Layout of the References task card



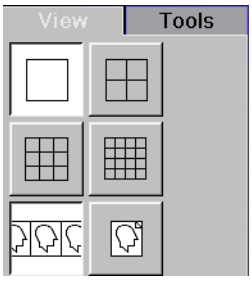
(1) Menu bar

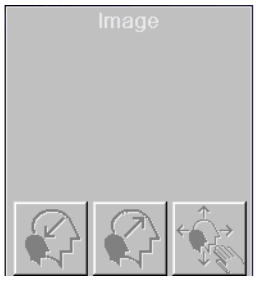
(2) Image area

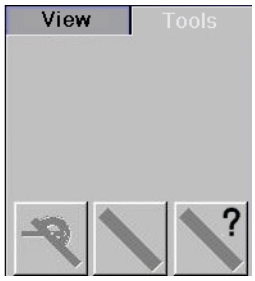
(3) Control area with subtask cards

Subtask cards

The function of the individual buttons is the same as in the **Viewing** task card. For a detailed description on how to use the buttons, please refer to (→ Register Viewing, Page 7).

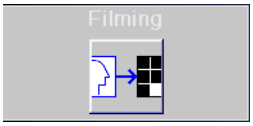






Using the **View**, **Image** and **Tools** subtask cards, you can easily change the display of reference images and perform measurements, if necessary.

The Tools task card is available, if your system disposes of the "measure angles and distances" option.



Using the **Filming** subtask card, you can copy the currently displayed image to the **Filming** task card. From there you can send it to a connected printer.

View subtask card

The **View** subtask card contains buttons for setting the layout.

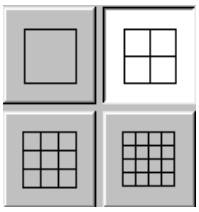
	Division of the screen (Single view, 4:1, 9:1 and 16:1)
	Image stripe display (gallery)
	Image stack display (stack)

Image subtask card

On the **Image** subtask card, you will find tools for image processing.

	Reduce image size to half (factor 0.5)
	Zoom in to double image size (factor 2.0)
	Zoom and pan

Tools subtask card

The **Tools** subtask card contains buttons for image evaluation.

	Angle
	Distance
	Calibration

Displaying reference images

Besides the live images on the left monitor, selected images can be displayed on the **References** task card, e.g. images that you might need for comparisons. You can transfer the relevant images before starting an examination, or you can define suitable live images as reference images during an examination.

As long as you do not perform an examination, you work directly at the monitor trolley in the **Viewing** and **References** task cards.

During an examination you can use the control panel of the C-arm system to control the individual functions of the **References** task card.

Operation at the monitor trolley

You can load images of completed examinations from the **Patient Browser** into the **Viewing** task card, and then into the **References** task card.

Images from the hospital network (e.g. archive) can also be loaded as reference images using the **Viewing** task card. Thus you have the possibility to display images of other modalities (e.g. MR, CT etc.) on the **References** task card.

Notes

Since permanent network functionality cannot always be guaranteed, reference images should be loaded from the network archive before starting an examination.

Once a patient has been registered for an examination, only images of the registered patient can be transferred to the **References** *task card.*

Transferring images

Selecting images

- Load the images of the requested patient into the **Viewing** task card by using the **Patient Browser**.
- Select the reference images in the image area.

You can also select a single frame from a series as reference image (with Subtraction option).

Loading the images

- Click on the icon button of the **References** task card in the control area of the **Viewing** task card.

– Or –

- Select **Patient > Copy to References** in the main menu of the **Viewing** task card.
  – The images selected in the **Viewing** task card are loaded into the **References** task card.

You can use the **View** *task card in the control area of the* **References** *task card to change the display of loaded images.*

Holding the reference image

The **Hold Reference** function allows you to select a particular image and then record it on the right monitor.

- In the **Options** menu of the **Examination** or **Viewing** task card, select **Hold Reference**.
  – The image is recorded on the right monitor. The menu entry is marked with a check mark.

If you save a new image, it is displayed on the right monitor and the held reference image is hidden. Scroll to the held reference image to show it again.

- To deactivate the function, deselect **Hold Reference** in the **Options** menu.

Operation at the C-arm system

During an examination the current live images are displayed in the **Examination** task card.

Select those live images that are suitable as reference images and transfer them to the right monitor in the **References** task card.

Transferring images

As soon as you save an image, it is displayed on the right monitor in the **References** task card.

Frequent activation of the Save button during fluoroscopy can delay the storage process. In this case an image other than the one last saved may be displayed. If this happens, manually scroll to the last image.

Saving an image

◆ Press this key on the control panel of the C-arm system.

Or

◆ Press this button on the hand switch.
  – The last acquired image is stored and displayed in the **References** task card.
  – If you continue with the examination, the last stored image is always displayed on the right monitor.

If **Hold Reference** *is activated for a particular image, this image will be permanently available on the right monitor.*
(→ Page 28)

Using the References task card

Besides transferring images, you can select other important functions of the **References** task card from the C-arm system.

Scrolling

- Scrolling to the next reference image.

- Scrolling to the previous reference image.

Changing the image display

- Toggling between single frame and multiple frame display.

- Selection of LUT steps on monitor B.

Printing

- Printout of one or several reference image(s) on the local printer.
  - If single frame display is selected, the image displayed on the right monitor is printed.
  - If multiple frame display is selected, the images selected on the reference monitor are printed individually.

Printing does not take place immediately. Images are first transferred to the **Filming** *task card and can be printed out later (provided that* **Auto Expose** *is de-activated).*

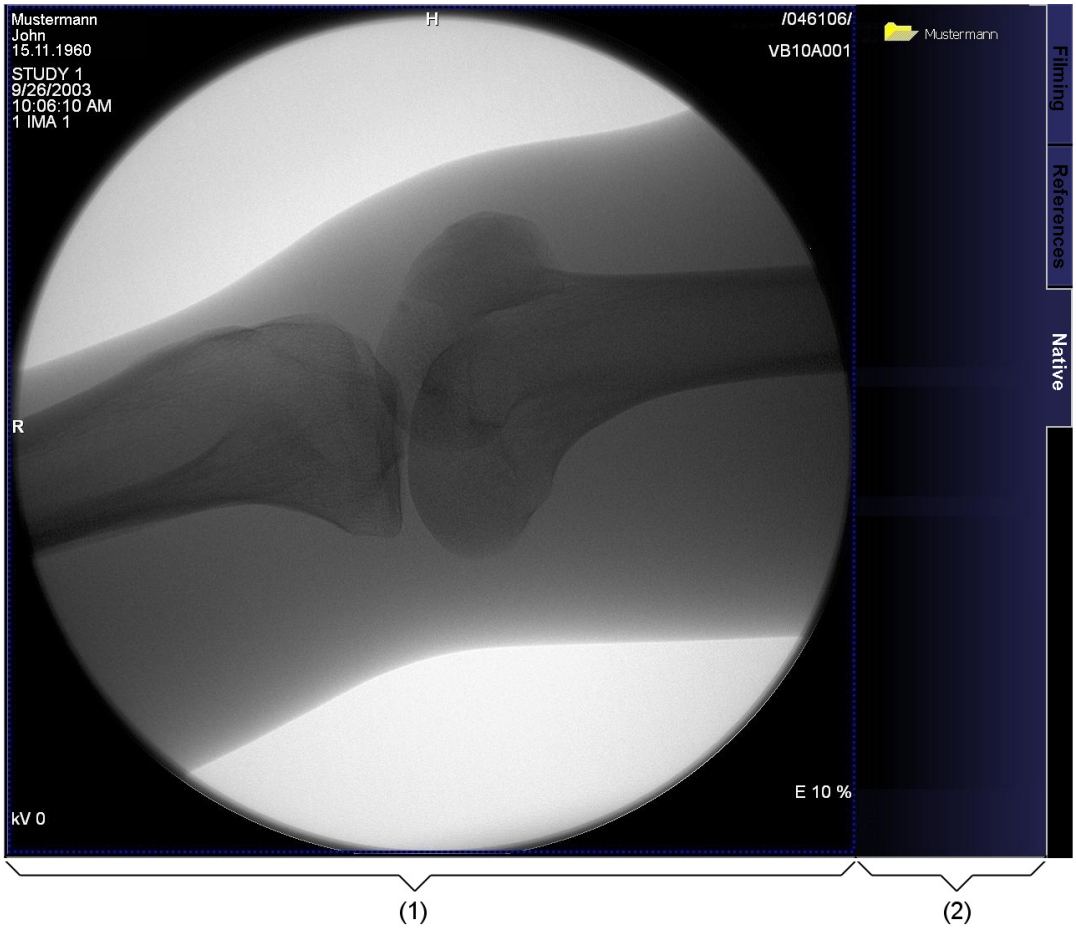
(→ Register Filming/Printing and Archiving, Page 19)

Native task card

The **Native** task card is available, if your ARCADIS Orbic system provides the **Subtraction** operating mode (option).

The ***Native*** task card allows you to have subtraction images shown on the left monitor simultaneously displayed as native images on the right monitor.

Layout of the Native task card



(1) Image area for displaying native images

(2) Control area with patient folder and status bar

Displaying native images

There are basically two cases in which you use the **Native** card for displaying unsubtracted images:

- ❏ During an examination simultaneously with the display of currently calculated subtraction images in the **Examination** card
- ❏ Outside of examinations, simultaneously with the display of subtraction images from the local database in the **Viewing** task card.

Native images with examinations

If you are working in the **Subtraction** operating mode and want to have the subtracted image shown on the left monitor displayed as a native image on the right monitor at the same time, you must select the **Native** task card before releasing radiation.

Displaying native images

- ◆ Before starting the exposure, click the **Native** tab on the right monitor.
  – The **Native** task card is placed in the foreground.
- ◆ Start your exposures with the hand switch or the footswitch on the C-arm system.
  – Each new exposure is simultaneously displayed as a native image on the right monitor and as a subtraction image on the left monitor.

Saving an image

When an image is saved, it is automatically transferred to the **References** task card. The **Native** task card stays in the foreground.

- ◆ Press this key on the control panel of the C-arm system.
  – The last acquired image is stored.
- ◆ Click the **References** tab.
  – The stored reference image is displayed.
- ◆ Click the **Native** tab.
  – The **Native** task card is placed in the foreground again.
  – Each additional exposure is displayed as a native image on the right monitor.

Deactivating the Native task card

If you want to deactivate the **Native** task card, simply select the **References** task card.

- ◆ Click the **References** tab.
  – The **References** task card is placed in the foreground.

Native images from the database

Native images from previous examinations acquired in the **Subtraction** mode (option) or **Roadmap** mode (option) are stored in the local database or in your archive together with the subtraction images. Both image types can be displayed simultaneously on both monitors.

Loading and displaying images

- Load the images of the requested patient into the **Viewing** task card by using the **Patient Browser**.
- Select **Sub > Sub/Native Display** in the main menu of the **Viewing** task card.

— Or —

- Click this button in the **Sub** subtask card.
  - In the **Viewing** task card the subtraction images are displayed on the left monitor.
  - In the **Native** task card the corresponding native images are displayed on the right monitor.

Closing the patient

After finishing your evaluation of patient images, close the folder of this patient. Now you can load images of the next patient.

- Select **Patient > Close Patient** in the main menu of the **Viewing** task card.
  - The images in the **Viewing** and **Native** task cards are unloaded. Both task cards are empty now.

Reports

Certain examination data can be stored as structured reports (SR).
ARCADIS Orbic offers two different types of reports:

- ❏ Radiation Summary Report
- ❏ LithoReport

Use The reports serve to document examination and treatment data. They are mostly generated automatically. You can read, edit, print and send reports.

Prerequisite Both types of reporting require the examination of a registered patient.

With the LithoReport option, please note that triggering of shots at the lithotripter is also possible only after the patient has been registered.

Security settings All processes related to reporting are recorded in the audit trail. This applies to generating, opening and editing reports as well as to printing and exporting reports.

Formats Reports are saved in two different formats. This allows them to be opened in different applications.

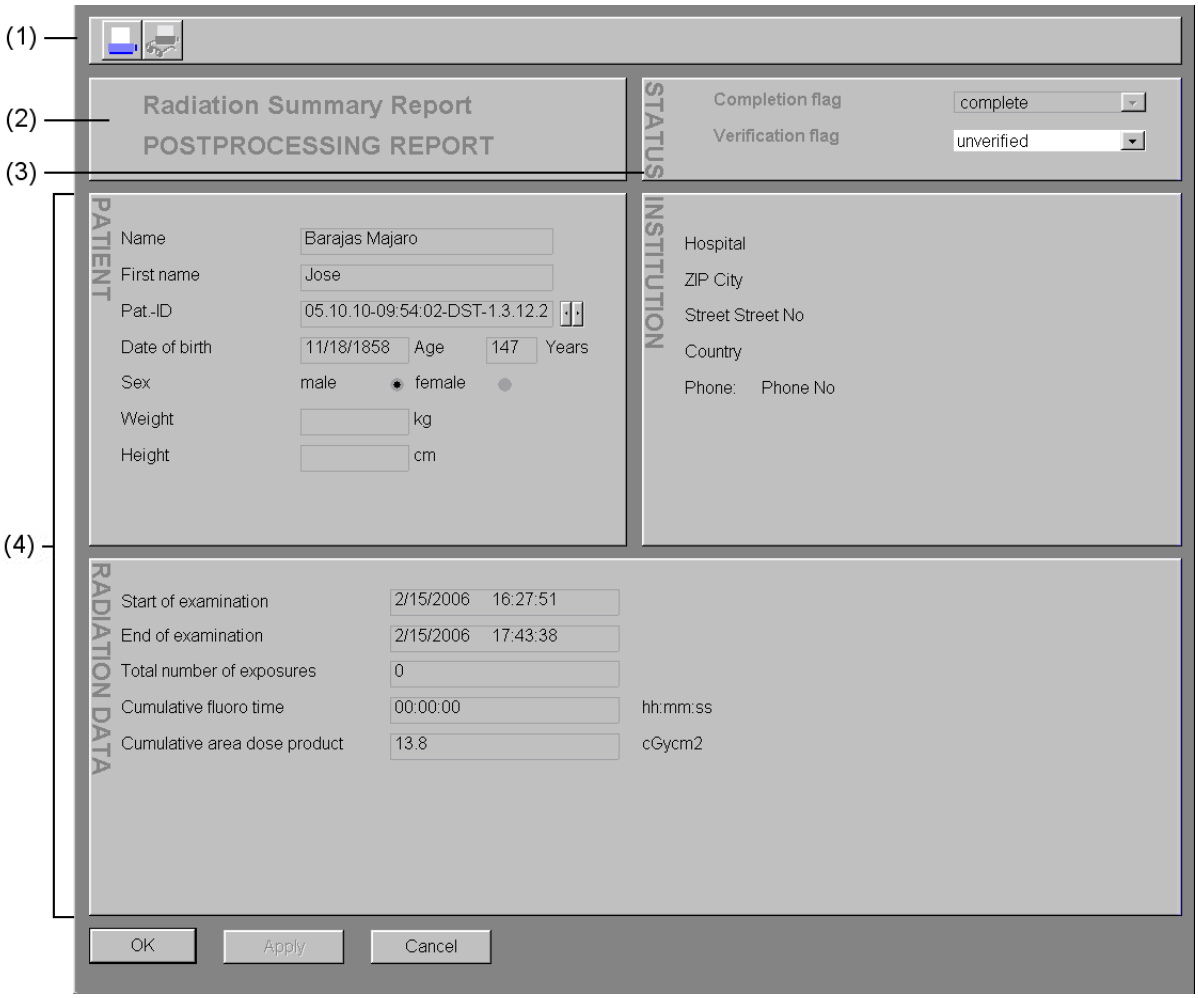
- ❏ Secondary Captures (SC)
  Allows loading into Viewing, for example; PACS compatible
- ❏ Structured Report (SR)
  Allows opening in the Report Editor

Display in the Patient Browser Reports are identified in the **Patient Browser** as follows, irrespective of the reporting type:

Symbol	Comment
	Symbol in the navigation area (series level)
	Symbol in the content area (instance level) Format: Secondary Capture (SC)
	Symbol in the content area (instance level) Format: Structured Report (SR)

Radiation Summary Report

The Radiation Summary Report contains the cumulated values for the number of exposures, examination duration and dose. The generation of this report is a fully automatic process.



(1) Icon buttons (printing a report)

(2) Generation status
EXAMINATION REPORT: Treatment in process, report is being generated.
POSTPROCESSING REPORT: Treatment is finished, the report has been completed and stored and can be postprocessed.

(3) Work status and verification status

(4) Content area

Opening a report

For the current patient

- Select **Reporting > Open report** in the **Examination** or **Viewing** task card.

— Or —

- Click the button in the control area (in **Viewing** on the Reporting subtask card).
  – The report for the current patient is opened.

If several reports exist for the patient loaded in the **Viewing** *task card, a dialog box is displayed in which you select the required report.*

For another patient

- Double-click the required report in the content area of the **Patient Browser**.

Or

- Select the report in the Patient Browser.

- Select **Reporting > Open report** or click the relevant button in the tool bar of the **Patient Browser**.
  – The selected report is opened.

Editing a report

Apart from the work and verification status, no changes are required in the Radiation Summary Report. The other entries can therefore not be edited.

Setting the status

The status for the postprocessing report is set according to the work progress. A report having the "verified" status can be printed out for documentation purposes.

- Select the relevant work status/verification status in the selection lists in the status area.

- Click **Apply**.

Printing a report

You can display a print preview of the completed report or send the report to a connected printer straight away.

Calling up the print preview

- Select **Reporting > Print Preview**.

— Or —

- Click this button.
  - The print preview of the report is displayed. Here you can scroll through the individual pages and check the entries.

Printing

- Select **Reporting > Print**.

— Or —

- Click this button in the report window or in the print preview.
  - The **Print Report** dialog box is opened. Here you can make the necessary print settings and start the print job.

LithoReport

The LithoReport is generated for extracorporeal shockwave lithotripsy (ESWL) provided that the lithotripsy function is enabled on your ARCADIS Orbic system and the lithotripter is connected to the C-arm system.

Part of the data are automatically recorded during treatment. Any other data can be added and postprocessed by you at any time.

1. Icon buttons (printing a report)
2. Generation status
   EXAMINATION REPORT: Treatment in process, report is being generated.
   POSTPROCESSING REPORT: Treatment is finished, the report has been completed and stored and can be postprocessed.
3. Work status and verification status
4. Content area

Opening a report

After starting the ESWL treatment, the Report Editor is automatically opened in editing mode. The relevant report needs to be opened manually only for later postprocessing.

Opening the report for the current patient

- Select **Reporting > Open report** in the **Examination** or **Viewing** task card.

— Or —

- Click the button in the control area (in **Viewing** on the Reporting subtask card).
  – The report for the current patient is opened.

If several reports exist for the patient loaded in the **Viewing** *task card, a dialog box is displayed in which you select the required report.*

Opening a report for another patient

- Double-click the required report in the content area of the **Patient Browser**.

Or

- Select the report in the Patient Browser.

- Select **Reporting > Open report** or click the relevant button in the tool bar of the **Patient Browser**.
  – The selected report is opened.

Editing a report

The content area of the LithoReport is subdivided into 4 cards in which you can add any missing information relating to the examination and treatment.

Entering patient and diagnostic data

On the **Patient/Diagnosis** card, you enter data relating to the diagnosis and your organization.

- Click the **Patient/Diagnosis** card into the foreground.
  – The patient data are automatically transferred from the registration.
- Enter the missing data in the active fields.
- Click **Apply**.

Entering treatment data

On the **Therapy** card, you enter data in preparation for treatment.

- Click the **Therapy** card into the foreground.
  – The shockwave data of the treatment are entered automatically.
- Enter the missing data in the active fields.
- Click **Apply**.

Adding summary data

The **Summary** card already contains the permanent examination data (in particular relating to radiation). Here you can enter additional information on the examination and treatment.

- Click the **Summary** card into the foreground.
  – The patient data are automatically transferred from the registration.
- Enter the missing data in the active fields.
- Click **Apply**.

Entering follow-up data

On the **Follow up** card, you enter the measures to be taken following the examination and treatment.

- Click the **Follow up** card into the foreground.
- Enter the missing data in the active fields.
- Click **Apply**.

Setting the status

For the postprocessing reports the work and verification statuses are set according to the work progress. A report having the "verified" status can be printed out for documentation purposes.

- Select the relevant work status/verification status in the selection lists in the status area.

- Click **Apply**.

Or

- Click **OK** to accept the changes and close the LithoReport.

*The **OK** button is enabled only if the patient has been closed.*

Printing a report

You can display a print preview of the completed report or send the report to a connected printer straight away.

Calling up the print preview

- Select **Reporting > Print Preview**.

— Or —

- Click this button.
  - The print preview of the report is displayed. Here you can scroll through the individual pages and check the entries.

Printing

- Select **Reporting > Print**.

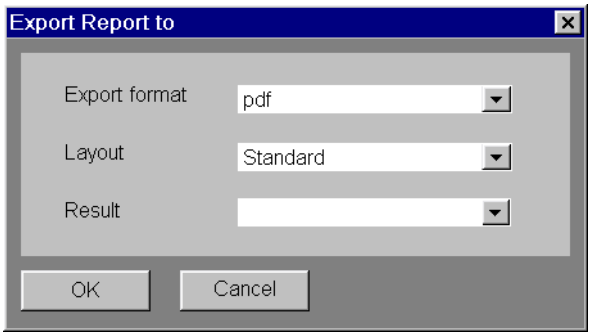
— Or —

- Click this button in the report window or in the print preview.
  - The **Print Report** dialog box is opened. Here you can make the necessary print settings and start the print job.

Exporting a report as PDF file

You can export a report as a PDF file. You can display and print this PDF file also on other computers with an **Acrobat Reader** program.

- Select the report you want to export as a PDF file in the **Patient Browser**.
- Select **Reporting > Export Report to...** in the **Patient Browser**.
  – The **Export Report To** dialog box is opened. The "pdf" export format is preset.



- Select a suitable layout for the PDF in the **Layout** selection list.
- Enter the name of the PDF in the **Result** field.

- Click **OK**.
  – The dialog box closes. The report is saved as a PDF file in the **CDR_OFFLINE** directory. From there you can record the file onto a CD.

Export for statistical evaluations

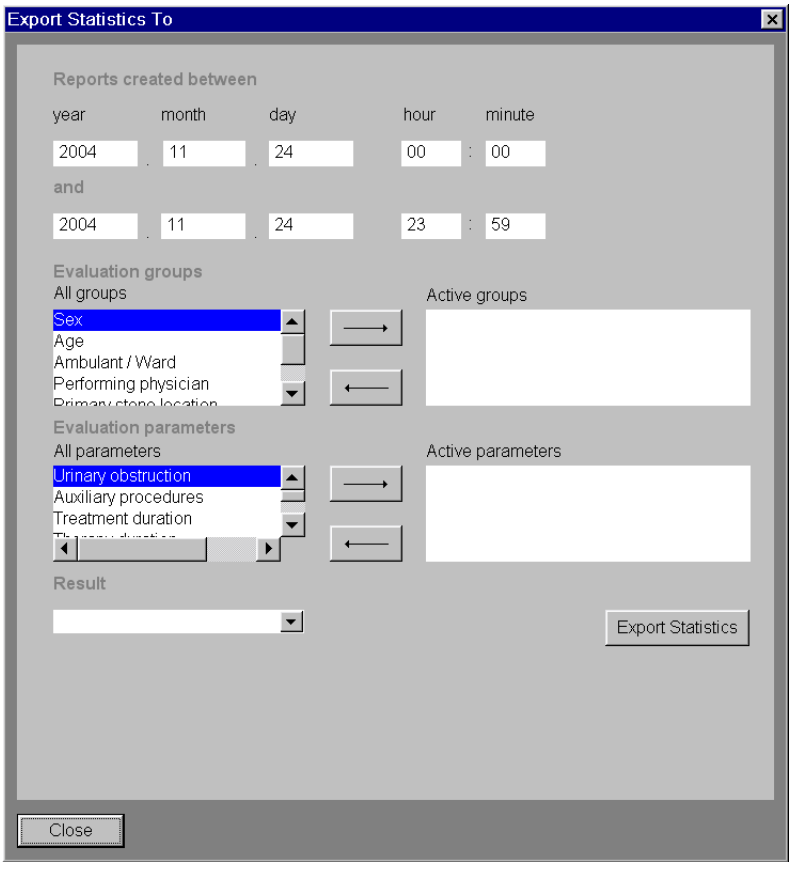
In the **Viewing** task card you can have statistical data on a LithoReport compiled taking into account other LithoReports, and export the data in meta format. The exported file can be opened and edited with different programs, e.g. Microsoft Excel.

A report can be exported only if it has reached the status "completed" and "verified".

Opening the export dialog window

In the export dialog you define the criteria for the comparison data. The program then searches the local database for all reports meeting these criteria.

- In the **Viewing** task card, open the LithoReport for which you want to compile comparison data.
- Select **Reporting > Export Statistics To** in the main menu.
  – The **Export Statistics To** dialog box is opened.



Exporting

- Define the reporting period, evaluation groups and evaluation parameters as filter criteria.
- Enter the name of the output file in the **Result** field.

- Click **Export Statistics**.
  – The data search is started and the file is exported. A progress bar informs you of the progress of the export process.

- Click **Close**.
  – The dialog box closes. The export process is continued in the background until it is sucessfully completed.

Configuration

The generation, printing and exporting of reports is configured in the **Structured Reporting** dialog. Depending on the type of report (LithoReport or Radiation Summary Report), you have different configuration possibilities.

Calling up the configuration window

The configuration window is called up from the syngo **Configuration Panel**.

◆ Select **Options > Configuration** in the main menu.

Structured Reporting

◆ Double-click the **Structured Reporting** button.
– The Structured Reporting dialog is displayed.

Configuring the LithoReport

To configure a LithoReport, you perform settings on the following cards:

❏ **Parameter sets**: Here you define the contents of different selection lists.

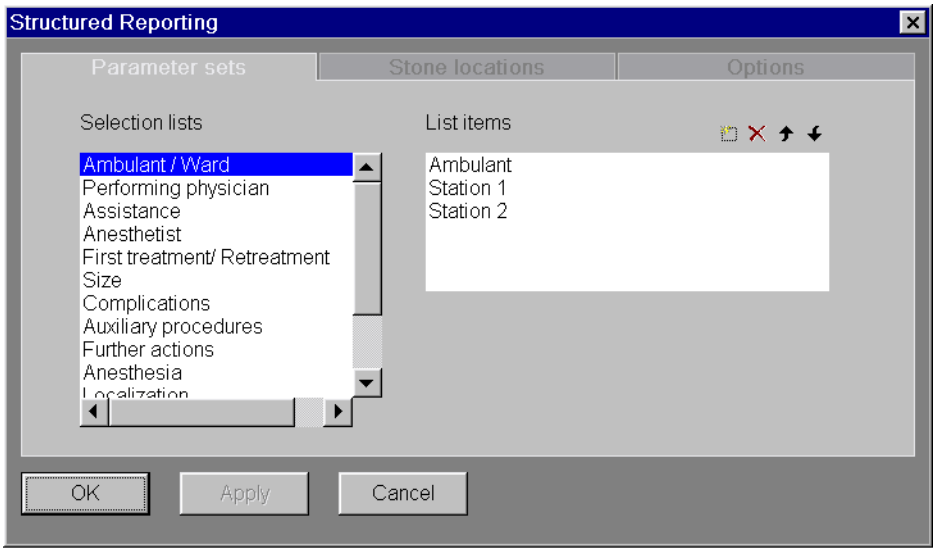
❏ **Stone locations**: Here you define the position indications for nephroliths (gallstones etc.).

❏ **Options**: Here you make the presettings for LithoReport printing.

Configuring selection lists

To generate a LithoReport, you define in the **Parameter sets** card which entries are shown in the selection lists.

- Click the **Parameter sets** card into the foreground.



- In the left list, select the parameter for which you want to configure the selection list.
  - In the right list you can see the currently available selection possibilities for this parameter.

Using the icon buttons above the list, you can adapt the list to your requirements.

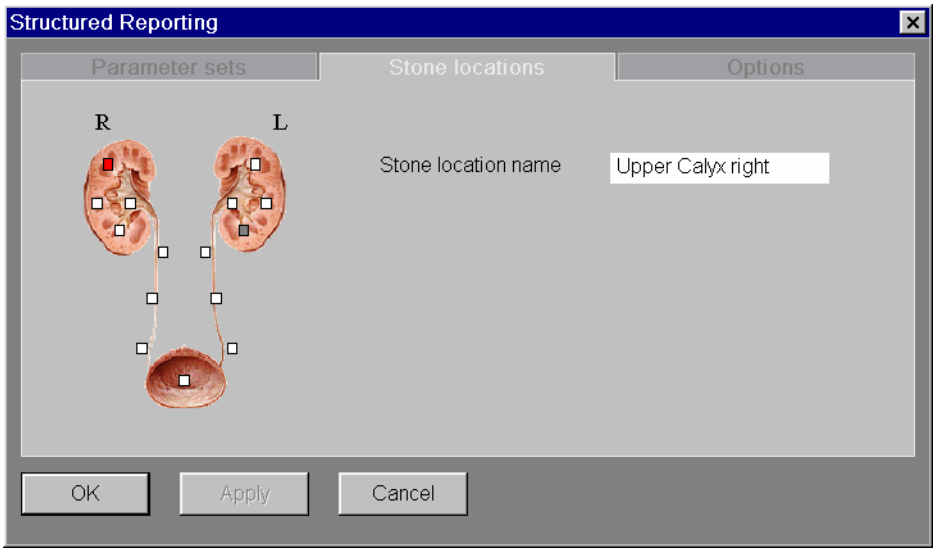
Symbol	Comment
	Inserts another list entry.
	Deletes the active list entry.
	Moves the active list entry up one line.
	Moves the active list entry down one line.

- If necessary, select the list entry that you want to edit and click on the icon of the required function.

Defining designations for stone locations

On the **Stone locations** card, typical body positions for nephroliths are displayed. Every position is marked by a small square. You can give a name to each of these locations.

- Click the **Stone locations** card into the foreground.



- Click on the square of the position to be named.
  – If this position has already been named, the name will be displayed in the entry field.
- Enter a suitable name.
- Proceed in the same way to name the other positions you require.

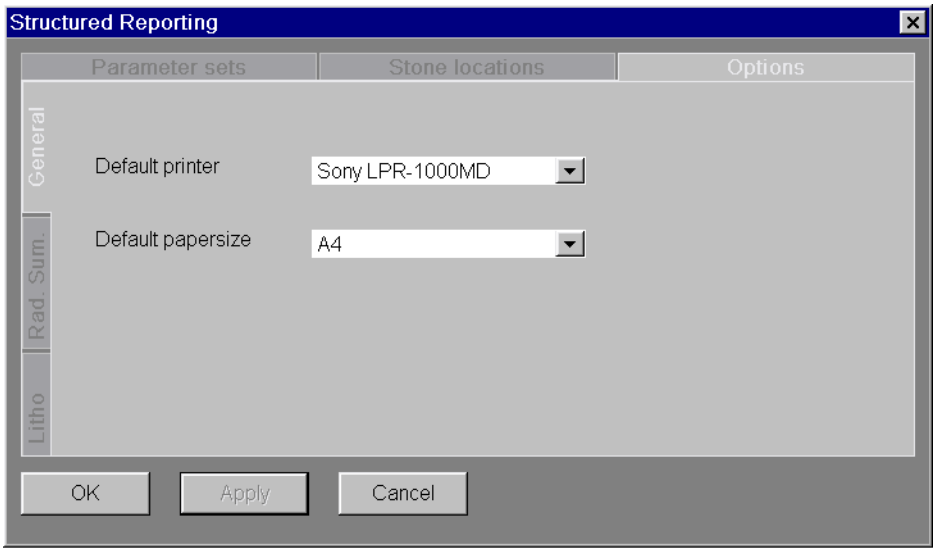
Defining print settings

On the **Options** card, you can define the print settings for the LithoReport.

- Click the **Options** card into the foreground.
  – The card has three subcards that you can access using the tab at the left-hand edge.

Defining default print settings

- Click the **General** tab card into the foreground to activate this card.



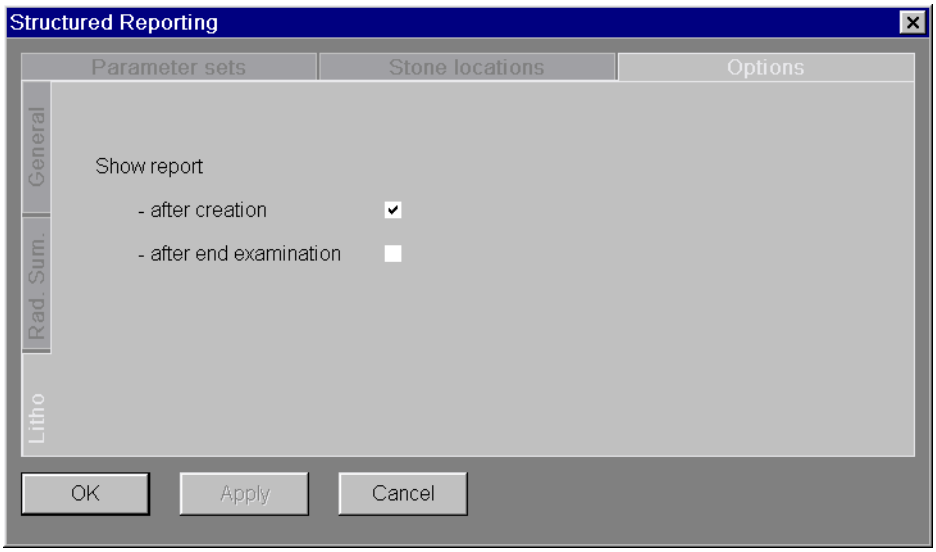
- Select the required printer from the **Default printer** selection list.
- Select the required paper size from the **Default papersize** selection list.

The default print settings on the **General** *subcard are valid for the LithoReport* **and** *the Radiation Summary Report.*

Displaying the LithoReport automatically

On the **Litho** subcard, you can define when a report is to be shown automatically.

- Click the **Litho** card into the foreground.



- Check the check box **after creation** if you want the report to be displayed automatically after it has been generated.
- Check the check box **after end examination** if you want the report to be displayed automatically at the end of the examination.

Configuring the Radiation Summary Report

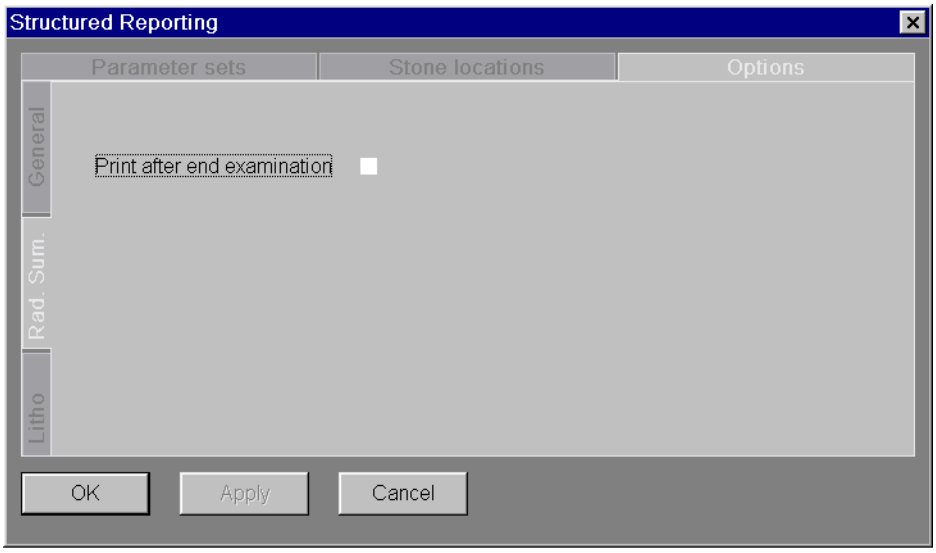
The **Options** card is available for the configuration of a Radiation Summary Report. No settings are made on the other two cards.

◆ Click the **Options** card into the foreground.
– The **General** subcard is opened.

The default print settings on the **General** *subcard are valid for the LithoReport* **and** *the Radiation Summary Report.*
(→ Page 49)

Printing the Radiation Summary Report automatically

◆ Click the **Radiation** subcard into the foreground.



◆ Check the check box **Print after end examination** if you want to print the Radiation Summary Report automatically at the end of the examination.

Applying configuration settings

After you have made all the required settings, you apply them to your system.

◆ To apply the settings and to close the Report Editor, click **OK**.

Or

◆ To apply the settings without closing the Report Editor, click **Apply**.

SIEMENS

Operator Manual
ARCADIS Orbic

Viewing

SP

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Please observe the

Safety register

This must be studied thoroughly before system startup.

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SP

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Introduction

On the **Viewing** task card, you can view the results of an examination and evaluate them. You can also compare image material of different examinations and, depending on the configuration, of different patients.

Loading and displaying images

You can load the images from the **Patient Browser** into the **Viewing** task card. Here you can select one of various ways of arranging the image material and displaying it in the clearest way for your diagnostic problem.

Processing and evaluating images

On the **Viewing** task card, you can then process and evaluate the images:

- ❏ You can change window values, enlarge, pan, rotate, and flip images.
- ❏ You can add comments to relevant image parts.
- ❏ You can measure and evaluate distances and angles in images.

Images that are loaded in the **Viewing** task card can also be loaded in the **References** task card. This also applies for patient images from previous examinations or images that were acquired with other modalities (e.g. MR/CT).

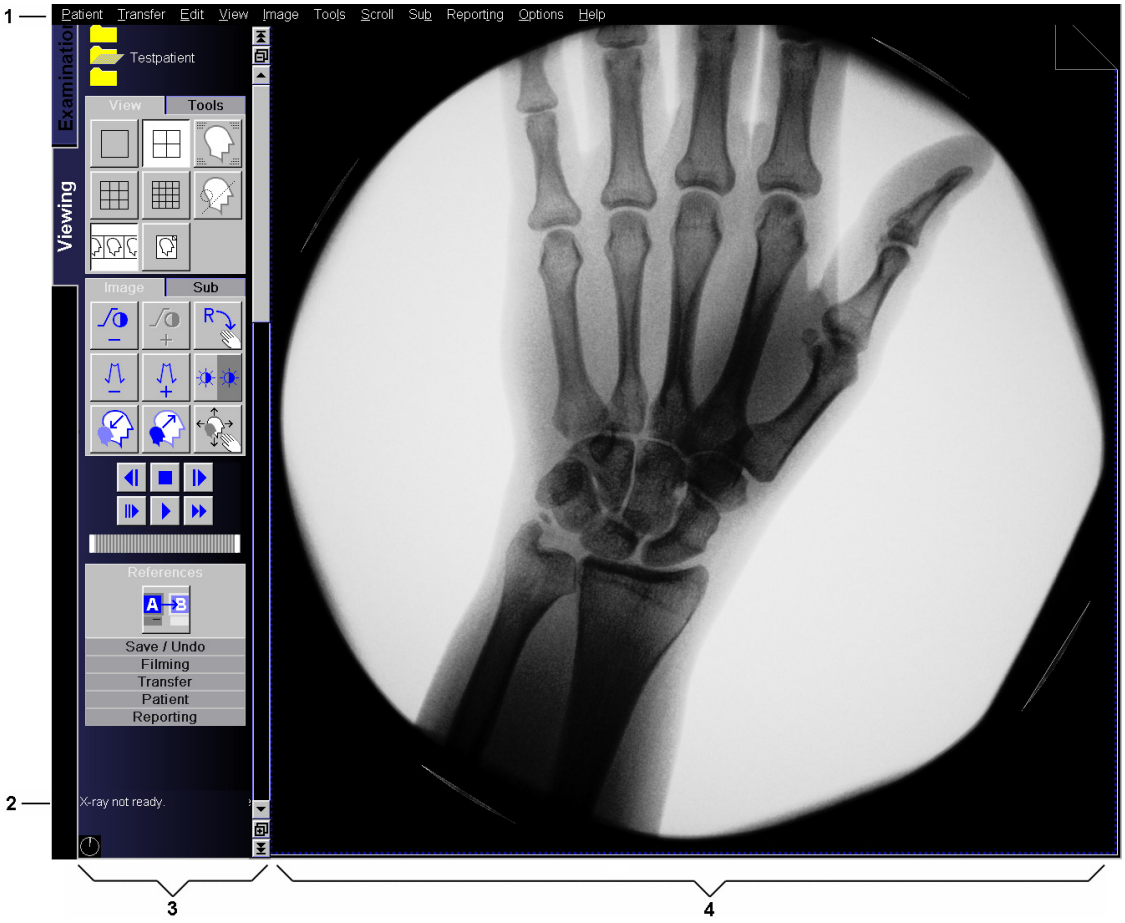
Storing, filming and transferring images

You can save the images you have processed and evaluated, you can print them or expose them on film or send them to other locations in your hospital.

The Viewing task card

As soon as you have loaded images into the **Viewing** task card, the task card moves into the foreground. You can, however, switch to other applications at any time and resume image processing on the **Viewing** task card later.

The **Viewing** task card is divided into four areas.



(1) Menu bar with specific entries for viewing and processing images

(2) Status bar for system messages

(3) Control area

(4) Image area

Image area

In the image area, the images that you have loaded into the **Viewing** task card are displayed.

Display of the image area

The image area is subdivided into segments. One image is displayed in each segment. Depending on the division of the screen and the number of images loaded, you can only see some of the images. The remaining images are in the background. The last loaded image is displayed in the top left segment.

You can choose between the following layouts:

- ❏ Small-format layout
  An overview of many images at the same time is displayed.
- ❏ Large-format layout
  Only a few images are displayed on one page in a format large enough to show all details.

Image, text and graphic objects

In the **Viewing** task card medical images can be supplemented with graphic elements or texts.

Control area

In the control area, you will find all the tools you need to select image material, arrange the screen display and process images.

Here you can also control data exchange with other parts of the program and access other applications.

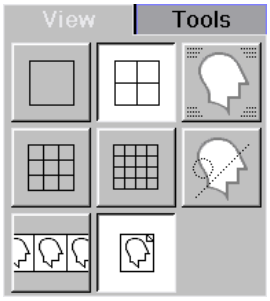
Patient information

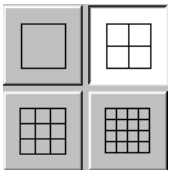
In the upper part of the control area, you can see the names of the patients whose images are currently loaded in the **Viewing** task card. In the **Viewing** task card, you can manage up to three patients.

Subtask cards

The subtask cards contain buttons for accessing editing tools, defining display modes, transferring image data and switching to other applications.

View subtask card The **View** subtask card contains buttons for setting the layout.





Division of the screen (full screen 4:1, 9:1 and 16:1)

Image stripe display (stripe)

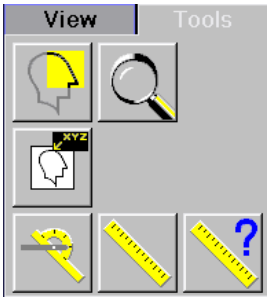
Image stack display (stack)

Showing/hiding image text

Showing/hiding graphic elements and comments

Tools subtask card

The **Tools** subtask card contains buttons for image evaluation and commenting.



Use a shutter

Magic glass

Insert an annotation into the image

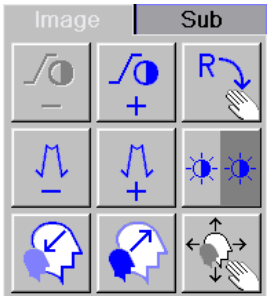
Angle (option)

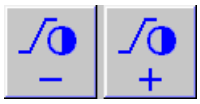
Distance (option)

Distance calibration (option)

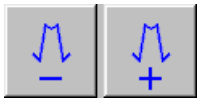
Image subtask card

On the **Image** subtask card, you will find tool buttons for image processing.

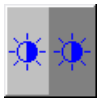




Switch brightness/contrast characteristic (LUT) to previous (–) and next (+)



Reduce (–) and increase (+) edge enhancement



Invert gray values

Minimize an image by factor 0.5

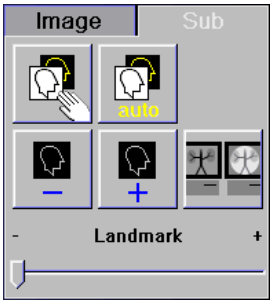
Magnify an image by factor 2.0

Zoom or pan the image

Rotate the image

Subtraction subtask card (optional)

The Subtraction subtask card is only available with the Subtraction option.



Pixelshift

Auto Pixelshift

Change the mask – and +

Dual Channel Mode (Sub/Native display)

- ❏ Subtracted image on monitor A (left)
- ❏ Native image on monitor B (right)

Display the anatomical background

Operating elements for filming

A scene can be played back as a movie.

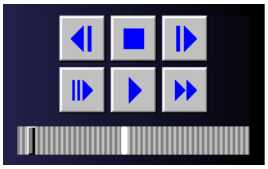


Image viewing elements for filming

References subtask card

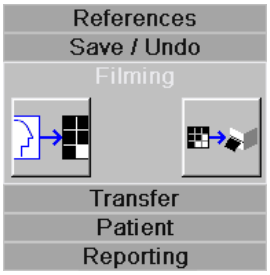
Copy an image into the **References** task card

Save/Undo subtask card

Save as

Reset all

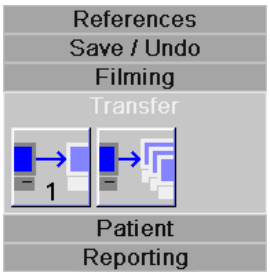
Filming subtask card



Copy to film sheet

Expose the film/print job

Transfer subtask card

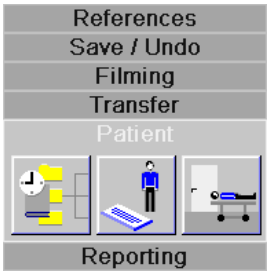


Send to (option)

Send to node 1 = standard node (option)

Archive to (option)

Patient subtask card

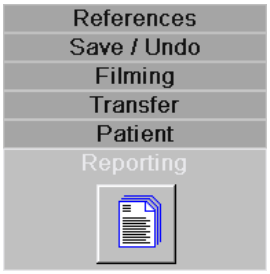


Scheduler

Patient registration

End the examination

Reporting subtask card



Open Radiation Summary Report/LithoReport

Loading and displaying images

In the **Viewing** task card, you can view and process images that are stored in the main database of your system, and archive them on different media or in a network.

You can access these data via the **Patient Browser**. You can search for patients, studies, series or individual images and load them into the **Viewing** task card.

Calling up the Viewing task card

As soon as you have loaded images into the **Viewing** task card, the task card moves into the foreground. You can, however, switch to other applications at any time and resume image processing on the **Viewing** task card later.

◆ Click the **Viewing** tab on the left-hand edge of the screen.
– The **Viewing** task card is placed in the foreground.

Transferring images from the Patient Browser

You can search for image data that you have stored in the local database or in the archive using the **Patient Browser** and then load the data into the **Viewing** task card.

- Select **Patient > Patient Browser**.
- Search for the required patient(s), study(s), series or one or more images in the navigation or content area.
- Double-click the entry or entries that you were looking for.

Or

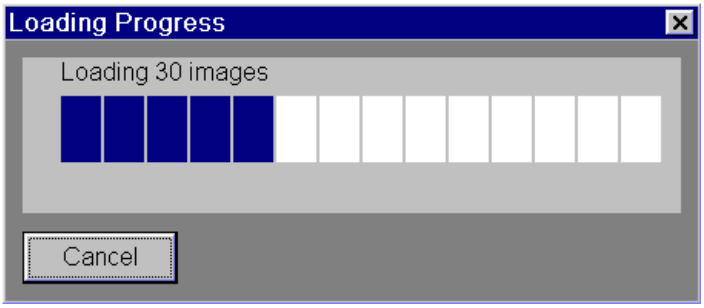
- Click the **Load to Viewer** button.

Or

- Select **Patient > Load to Viewer**.

Or

- Drag your selection onto the **Viewing** task card with the mouse (*drag & drop*).
  - The image data are loaded into the **Viewing** task card.
  - The progress window **Loading images ...** is displayed.



If you transfer further images of a patient who is already loaded in the **Viewing** *task card, the new images are attached to the existing ones.*

Images of series or studies that are already in the task card are not loaded a second time.

When you load scenes, each scene is displayed as a separate series. If you load a series consisting of several scenes and normal images, each scene and all normal images are loaded as a separate series.

Displaying images and series

After you have loaded images into the **Viewing** task card, you can choose between different views.

Selecting image stripe display

Medical images are always displayed in the image area of the **Viewing** task card grouped by studies or series.

Select image stripe display to view the loaded series of a study one after the other image by image.

- Select **View > Stripe**.

Or

- Click the **Stripe** button in the **View** subtask card.
  - Image stripe display is activated. You see the images of the first loaded series displayed in the image area from top left to bottom right.

Selecting image stack display

If you want to compare the images of various series of one study, you best select stack display.

- Select **View > Stack**.

Or

- Click the **Stack** button on the **View** subtask card.
  - All images of a series are now arranged in a stack one on top of the other. You can see the first image of each series.

Subdividing the image area

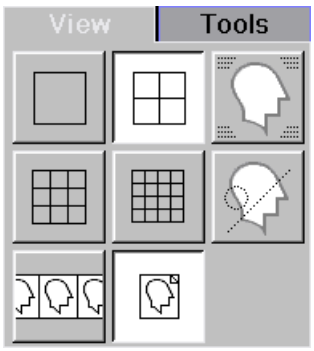
With the division of the image area, you define the number and size of the segments in the image area.

Switch to a large-format display with just a few images on the screen if you want to see diagnostic details. Select a small-format display with many images to obtain an overview.

- Select a layout in the **View** menu.

Or

- Select a layout with the buttons on the **View** subtask card.



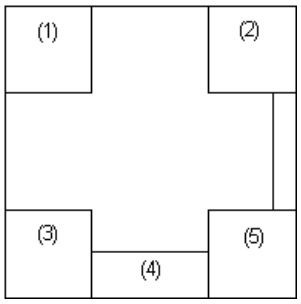
– When you select a new layout, the division of the image area is changed, but the sequence of the images displayed remains the same.

Showing and hiding image text

Patient and study-specific information and image settings can also be displayed on the images, thus making it easier to identify each image. The image text can also be filmed/printed.

Text blocks

The information displayed is arranged in blocks around the edge of the image according to its content.



(1) Patient data

(2) Hospital/system information

(3) Acquisition-specific settings

(4) Image comment

(5) Window values and edge enhancement

Especially with a small-format layout, the images displayed can become cluttered by image text. You can then decide whether you want to have the image text shown in the image or not.

- Select **View > No Text**.

Or

- Click the **Showing and hiding image text** button on the **View** subtask card.

Displaying and hiding graphic elements

Like text information, you can have graphics (e.g. distance lines) and annotations displayed or hidden.

- Click the **Hide Graphics** button in the **View** subtask card.

Or

- Select **View > Hide Graphics** in the menu bar.
  – The graphics and annotations are hidden.

Scrolling and selecting images

You will usually have loaded more images and series of a patient into the **Viewing** task card than can be displayed in the image area at once. All those images that cannot be displayed due to lack of space are placed in the background.

Scrolling

The **Viewing** task card provides you with several alternative ways of scrolling through loaded images of different patients, studies, or series:

- **Scroll** menu
- Scroll bar on the left-hand side of the image area (depending on the configuration)
- Buttons on the **View** subtask card in the control area (depending on the configuration)
- Dog ears in the upper right corner of the images (in the stack display)
- Keyboard and symbol keypad

Depending on the processing stage and working method you are accustomed to, you can select your individual way of working.

Scrolling image by image

Within a study, you can scroll through the loaded images and series image by image.

Scrolling with image stripe display

- Select **Scroll > Next Image** or **Scroll > Previous Image**.

Or

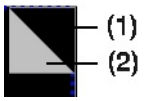
- Scroll with the **Image-** or **Image+** keys of the symbol keypad.
  – You scroll backward or forward by one image.

Explicitly selected images remain selected even if the images are moved into the background.

Scrolling image by image in a stack

- Click on the stack through which you want to scroll with the mouse.
- Scroll from image to image in a stack with **Image+** or **Image-** just like in image stripe display.

Or



- Click on the outer triangle (1) or on the inner triangle (2).
  – You scroll forward or backward by one image.

If you want to scroll through a stack of images very quickly, click on a dog ear and hold the mouse button down.

Scrolling through several stacks image by image

- Press the **Ctrl** key and click on the stacks that you want to scroll through. If you click on a stack again, you deselect it.
- Using the **Scroll** menu, the buttons or the symbol keypad, scroll forward (**Image+**) or backward (**Image-**) through the selected stacks by one image at a time.

If you have not selected a stack, you only scroll through the stack which has the input focus.

Scrolling page by page

A screen page can contain different numbers of segments depending on the layout selected and it may contain only images of one series or images of more than one series depending on the display mode.

You can use the menu, keyboard, or scroll bar to page through the series of a study.

Scrolling with the menu

- Select **Scroll > Page Up**.
  – You scroll forward by one page.
- Select **Scroll > Page Down**.
  – You scroll back by one page.
- Select **Scroll > Last Page**.
  – You jump to the last page of the current patient folder.
- Select **Scroll > First Page** to jump back to the first page of the current patient folder.
  – You jump to the first page of the current patient folder.

The first image of the series is displayed in the top left segment of the image area.

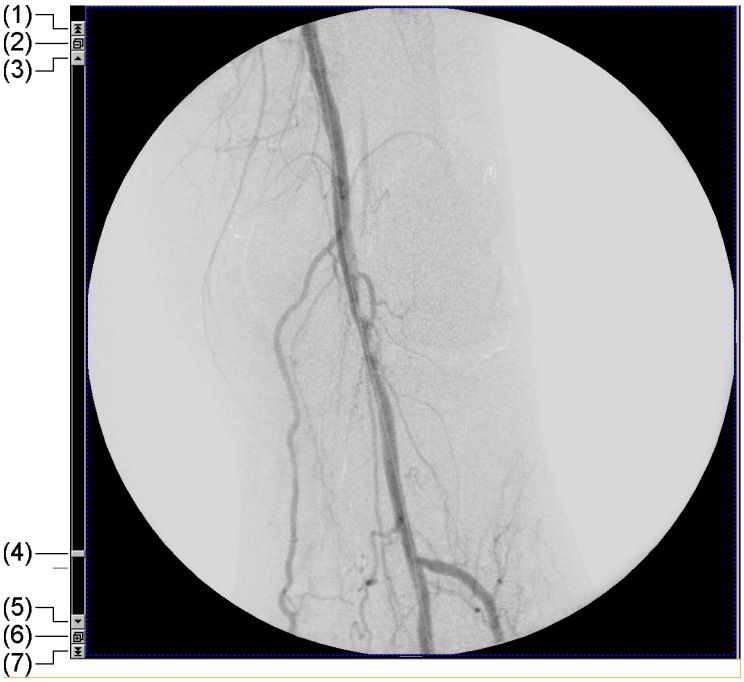
Scrolling page by page with the keyboard

- Press the **Page Up** key.
  – You scroll forward by one page.
- Press the **Page Down** key.
  – You scroll backward by one page.
- Press the **End** key.
  – The last screen page of the study is displayed.
- Press the **Home** key.
  – You jump to the first page of the study.

The image area is filled with images. The first image of the series is displayed in the top left-hand corner of the image area.

Scrolling with the scroll bar

The third way of scrolling through the images and series of a study is to use the scroll bar.



(1) Scroll arrow for first page

(2) Scroll symbol for previous page

(3) Scroll arrow for previous page

(4) Slider

(5) Scroll arrow for next page

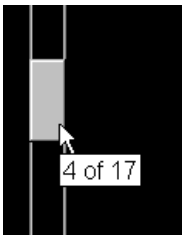
(6) Scroll symbol for next page

(7) Scroll arrow for last page

◆ Click the scroll arrow for the next or previous page.
– You jump backward or forward by one page/line within the series.

◆ Click the scroll arrow for the first or last page.
– You jump to the corresponding screen page of the loaded series.

◆ Click the scroll symbol for the next or previous page.
– You jump from the beginning / end of the series to the end of the previous series / beginning of the next series (scrolling across series).
– If you are in the middle of a series, you first jump to the beginning/end of the current series.



◆ Drag the slider up or down with the mouse until the page you require is displayed. (The page number is also displayed.)

If you click the scroll bar above or below the slider, you scroll backward or forward by one page.

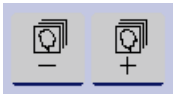
Scrolling from series to series

In addition to scrolling image by image and page by page, you can also scroll by entire series if you have loaded more than one series of a study into the **Viewing** task card.

It depends on the selected display which images are subsequently displayed in the image area. In image stripe display, for instance, the first image of the series to which you have scrolled is displayed in the first image segment. In stack display, you move the series stacks to the left or right by one position, and up or down line by line.

- Select **Scroll > Next Series** or **Scroll > Previous Series** in the main menu.

Or



- Press the **Series-** or **Series+** button on the symbol keypad.

Or

- Scroll with the image scroll symbols in the scroll bar.

Scrolling from study to study

The image area of the **Viewing** task card contains all the images of the loaded studies and series, provided they all fit on one screen page.

As soon as you have loaded the images, the images of the first study are displayed starting at the top left.

- Select **Scroll > Next Series** or **Scroll > Previous Series** in the main menu.
  – You scroll forward or backward by one study.

Or

- Scroll to the next or previous study using the **Study+** or **Study-** key.

Selecting images

On the **Viewing** task card, you cannot only view images, but also process and evaluate them.

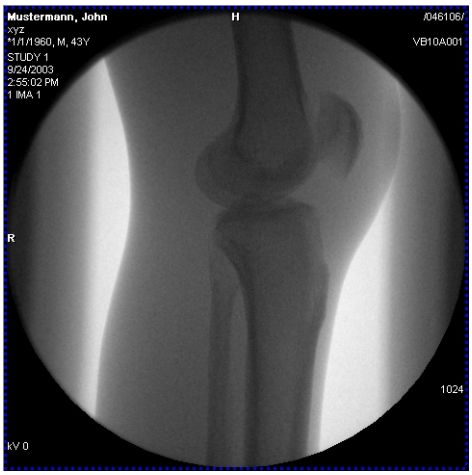
Selection possibilities

There are two different ways of selecting images for processing:

- ❏ *explicitly* holding the **Ctrl** key down (explicitly selected images are shown with a continuous border)
- ❏ *implicitly* by working in the input focus

Working in the input focus

The input focus shows the active segment of the image area. It is marked by a dashed border, i.e. it is selected implicitly.



Default input focus

When you load images into the **Viewing** task card, the input focus is in the default position in the top left segment of the image area.

Placing the input focus with the mouse

◆ Using the left mouse button, click into the segment of the image area on which you want to place the input focus.

An explicitly selected image or an explicitly selected graphic is deselected if you place the input focus on a segment, even if you only click on the same segment.

Changing the input focus using the keyboard

◆ Press the arrow key **left** or **right**.
  – The input focus is moved to the next column of the image area.

Or

◆ Press the arrow key **up** or **down**.
  – The input focus is moved to the next row of the image area.

If an image or a graphic is selected explicitly, the arrow keys are not active.

Processing an image

As long as you have not selected any images explicitly, your processing steps are applied to the image in the segment that has the input focus, i.e. the image with the dashed border.

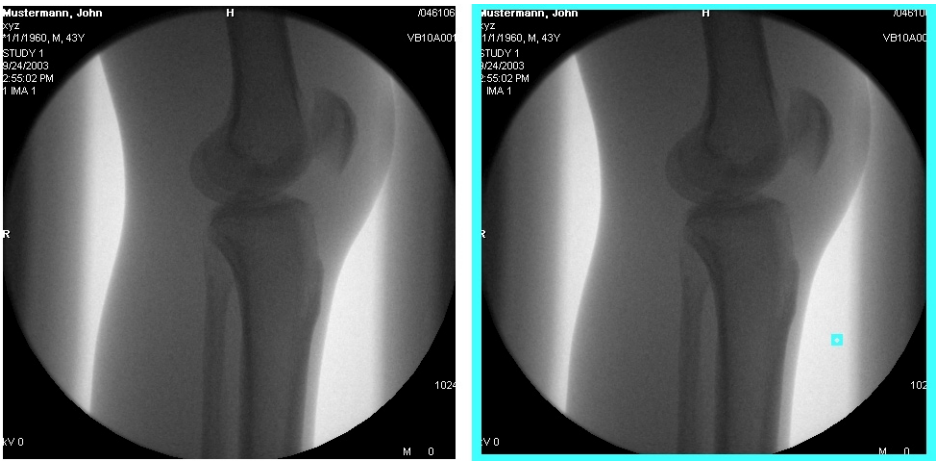
◆ Place the input focus on the image that you want to process.

If you cannot see an input focus in the image area, one or more images are explicitly selected in the background.

Selecting images explicitly

Selecting images explicitly means that you select images or series specifically and one after the other. Unlike the input focus, the explicit selection is associated with the content of the segment. Explicitly selected images remain selected even if you move them into the background.

All explicitly selected images have a continuous border.



Selecting images individually

- Press the **Ctrl** key and click an image with the left mouse button.
  – The image is selected explicitly.
- Hold the **Ctrl** key down and click on further images if you want to extend your selection.
  – Several images are selected explicitly one after the other.

Selecting images explicitly up to the end of series

- Click on the image that you want to select explicitly holding the **Ctrl** key down, or set the input focus by clicking on the image.
- Select **Edit > Select On Succeeding** in the main menu.
  – The selected image and all the following images are now selected.

If you have explicitly selected images of different series, the remaining images of these series are selected starting with those images.

Explicitly selecting complete series

- First, select an image of the required series explicitly by clicking on it holding the **Ctrl** key down, or place the input focus on the image by clicking on it.
- Select **Edit > Select Series** in the main menu.
  – The whole series is now selected explicitly.

Selecting more than one series explicitly

- Hold the **Ctrl** key down and click on individual images of the required series.
- Select **Edit > Select Series** in the main menu.
  – Several series are selected completely.

Deselecting images

If the explicit selection of images does not contain the set of images you require, you can deselect individual images or all images.

- Place the input focus on an unselected segment manually with the mouse by clicking on it.

Or

- Select **Edit > Deselect All** in the main menu.
  – All selected images are deselected again.

After that, the standard input focus is set automatically, i.e. the top left segment is active.

Selecting direct image processing

Direct image processing (implicit selection) with the mouse is automatically applied to the image segment on which the mouse cursor is located.

Setting the input focus

- Place the mouse cursor on an image which is not selected and edit the image, for example, by windowing.
  – The input focus is placed on this segment.

If graphics were previously explicitly selected in the input focus, they remain explicitly selected.

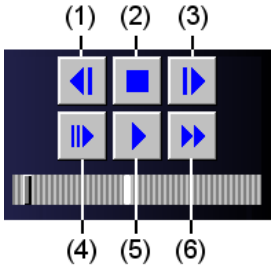
Viewing images in movie mode

After an examination, you can start movie mode to check the quality of the scenes you just acquired.

Movie mode is possible only for scenes generated at the ARCADIS Orbic. You cannot view imported series in movie mode.

Movie mode is active only in the **one image per page** *layout.*

For movie mode a large image segment is used. The images of a series are played back like a movie.



(1) Scrolls one image backward

(2) Stops movie mode

(3) Scrolls one image forward

(4) Starts movie mode in slow motion

(5) Starts movie mode in real time

(6) Starts movie mode with double speed

Image text and graphic objects are not displayed during movie replay.

Scrolling a single image

In the movie segment, you can scroll through all images of the series.

◆ Click the **Step Backward** button.
– You scroll backward by one image.

◆ Click the **Step forward** button.
– You scroll forward by one image.

Starting movie mode

In movie mode the images of a series are displayed in a loop. After the last image of the series, the first image is displayed again etc.

You have the following possibilities to optimize movie display and set the speed according to your requirements:

❏ slowly

❏ real time

❏ fast

◆ Select **Scroll > Realtime Movie** or click the button.
– The movie is started with the original frame rate.

Or

◆ Select **Scroll > Half Speed Movie** or click the button.
– The movie is started with half the frame rate.

Or

◆ Select **Scroll > Double Speed Movie** or click the button.
– The movie is started with double the frame rate.

The playback speed may be reduced by postprocessing activities, edge enhancement or subtraction.

Stopping movie mode

- Select **Scroll > Pause Movie** or click the button.
  – The movie is stopped.
  – If you continue playback of the movie, it will start from the beginning again.

There is no indication where the film was stopped.

Storing the scene

Scenes of a currently running examination that have not yet been saved can be stored using the Last Scene Hold function.

Prerequisite: Scene review has been stopped.

- Select **Patient > Save LSH Scene** in the main menu.

— Or —

- Press function key **F9** on the keyboard.
  – The last 120 images are stored in the local database.

Editing images

As soon as you have loaded all the series and/or images that you want to view and process into the **Viewing** task card, you can change the display parameters of individual images. In this way, you can emphasize areas and image contents for subsequent evaluation or reporting.

You can adapt the window values of the loaded images. You can enlarge segments and display regions of interest in the center of the screen. You can also rotate, flip or invert images for certain diagnostic problems.

Extreme window values can impair image quality.

With scenes, the image processing functions are applied to all images of a series.

Windowing images

Imaging methods provide information in the form of gray scale images with up to several thousand different gray scale values. Windowing means to emphasize the range of gray scales of the relevant area and tissue type.

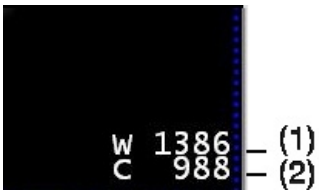
The first step in windowing therefore consists in determining the window center, i.e. the gray value of the tissue type that is central to your diagnostic problem. The smaller the window center, the brighter the image.

By setting the window width you define how many gray values above and below the center value you want to see. The smaller the window width, the higher the contrast.

Windowing of color images is not possible.

Displaying window values

You can see the window values set in the bottom right-hand corner of the images.



(1) W: Window width – Contrast

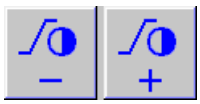
(2) C: Window center – Brightness

Assigning fixed window settings (LUTs)

Some imaging methods allow you to display images with alternative window settings via LUTs (look-up tables).

The currently selected LUT is displayed at the bottom right of the image (with display of window values).

- Select the images that are to be assigned a different LUT.
- Click the **LUT Previous -** or **LUT Next +** button on the **Image** subtask card.



Windowing using the mouse

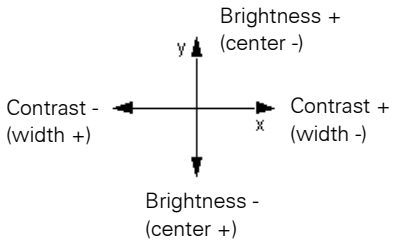
You can assign new window values to images using the mouse.

Pay attention to the scope.

- Click on an image segment with the center mouse button and move the mouse holding the button down.
  – The mouse cursor disappears.
- Drag the mouse up or down.
  – The window center (brightness) is changed.

Or

- Move the mouse right/left.
  – The window width (contrast) is changed.



  – As soon as you release the mouse button, the new window values are also applied to all the other selected images or the selected scope of action.

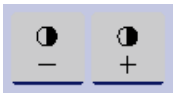
The changed window values are displayed immediately in the image (interactive windowing).

Windowing with the keyboard

For fine adjustment of the window values, you can also use the keys on the symbol keypad of the keyboard.

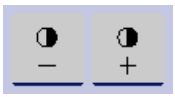
Pay attention to the current scope.

Setting the contrast



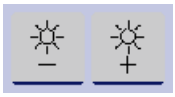
◆ Press the **Width-** or **Width+** button.
– The contrast is reduced or increased in small steps.

Or



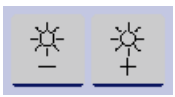
◆ Keep the **Width-** or **Width+** button pressed.
– The contrast is reduced or increased in larger steps.

Setting the brightness



◆ Press the **Center-** or **Center+** button.
– The brightness is reduced or increased in small steps.

Or



◆ Keep the **Center-** or **Center+** button pressed.
– The brightness is reduced or increased in larger steps.

Restoring window values

◆ Select **Image > Reset Window**.
– The selected image(s) is/are displayed with their original window values.

Edge enhancement

Blurred images, or images with a high noise level, can be postprocessed with a filter. Edge enhancement is an adaptive filter that emphasizes existing structures (edges) in the image.

The enhancement factor can be set within a range of 0 % to 100 % in 10 % increments.

- Select one or more images or series.

- Click the **Edge Filter Next** button on the **Image** subtask card.

Or

- Select **Image > Edge Filter Next**.
  – The image is displayed with enhanced structures.

The higher the filter setting, the more structures are enhanced and the less they are smoothed.

- Click the **Edge Filter Previous** button on the **Image** subtask card.

Or

- Select **Image > Edge Filter Previous**.
  – The image is displayed with less enhanced structures.

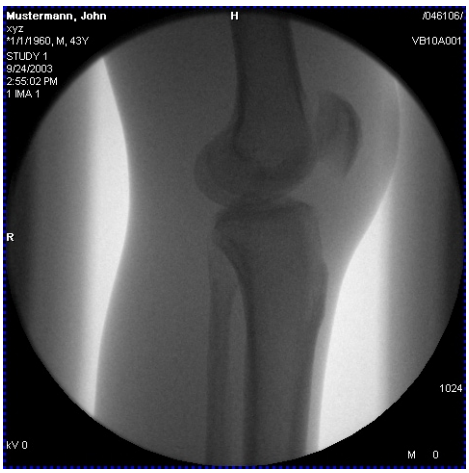
Zooming and panning images

Sections of images that are of particular interest to you can be zoomed in. If the enlarged image then no longer fits in the segment, you can pan it until the relevant area is in the center of the segment again.

Zooming images

The **Viewing** task card provides you with several possibilities of enlarging or reducing images.

Displaying images in double size/half size



◆ Select the images that you want to edit.

- Click the **Zoom Out By 0.5** button.
  – The zoom factor of an image is halved.

Or

- Click the **Zoom In By 2.0** button.
  – The zoom factor of an image is doubled.

Zooming with the mouse

The left mouse key is used to select or deselect images and objects. However, you can also switch over the function of the left mouse button to zoom and pan images.

- Select **Image > Zoom/Pan**.

Or

- Click the **Zoom/Pan** button on the **Image** subtask card.

- Now place the mouse cursor close to the edge of an image.
  – The mouse cursor changes shape.
- Drag the mouse cursor up with the left mouse button pressed.
  – The image is enlarged.

Or

- Drag the mouse cursor down with the left mouse button pressed.
  – The image is reduced.
  – As soon as you release the mouse button, the new zoom factor is applied to all the selected images or the selected scope of action.

When zooming, make sure you do not accidentally click on a graphic element. Otherwise, you would pan the graphic element and not the content of the image.

- Deselect **Image > Zoom/Pan** again.

Or

- Click the relevant button again.
  – The left mouse button is available for selecting images again.

Panning images

After you have zoomed images, parts of the images might extend beyond the edge of the image segments. Therefore, before saving an image, always pan the image so that the region of diagnostic interest is in the center of the segment again.

- Select **Image > Zoom/Pan**.

Or

- Click the **Zoom/Pan** button on the **Image** subtask card.
  – The function of the left mouse button is now switched from Select to Zoom/Pan.

- Now place the mouse cursor in the center part of the image.
- Keeping the left mouse button pressed, drag the mouse up, down, to the right or left to pan the image as required.
  – You can immediately see the result of your mouse movements in the image on which the mouse cursor is located.

When panning, make sure you do not accidentally click on a graphic element. Otherwise, you would pan the graphic element and not the content of the image.

Restoring image display

- Select **Image > Reset Zoom/Pan**.
  – The original size with which the images were last stored in the database is restored.

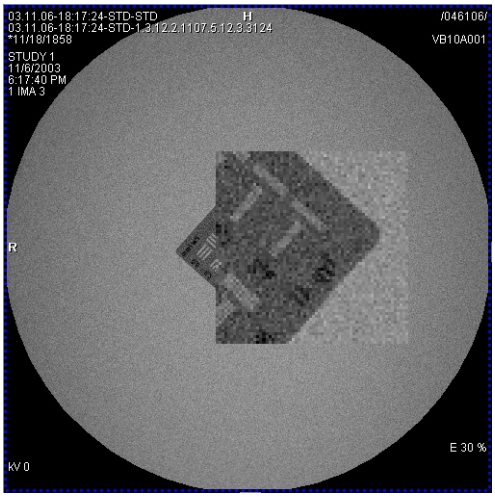
Enlarging an image section

Instead of zooming an image and then panning it so that the relevant section is in the center of the screen again, you can also quickly select specific image sections and display them in a segment in maximum size.

- Select the image in which you want to display an enlarged image section.
- Select **Tools > Magic Glass**.

Or

- Click the **Magic Glass** (Zoom) button on the **Tools** subtask card.
- Click on the selected image with the left mouse button.
  – A rectangular image is displayed with zoom factor 2.0. In this window the enlarged area of the image around the position of the mouse key is displayed.



- Move the mouse button in the segment.
  – The content of the enlarged window is automatically updated.

Switching off the zoom function

- Select **Tools > Magic Glass** again.

Or

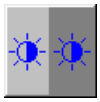
- Click the **Magic Glass** (Zoom) button on the **Tools** subtask card.
  – The magnify windows are deleted from all segments. The original size with which the images were last stored in the database is restored.

Inverting images

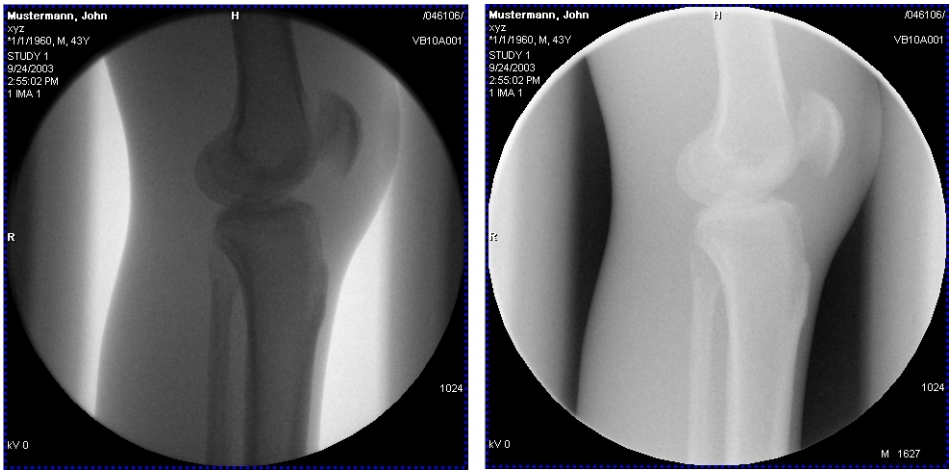
When an image is inverted, bright areas in grayscale images are displayed dark and dark areas are displayed bright. The gray scale assignment in the LUT (look-up table) is inverted.

- Select the images that you want to edit.
- Select **Image > Invert Gray Scale**.

Or



- Click the **Invert Gray Scale** button on the **Image** subtask card.



To reset the original view, select **Image > Invert Gray Scale** *again.*

Rotating images

- Click on the image that you want to edit.
- Select **Image > Rotate**.

Or

- Click the **Rotate** button on the **Image** subtask card.
  – The shape of the mouse cursor indicates that you can now rotate the image to the left or right.

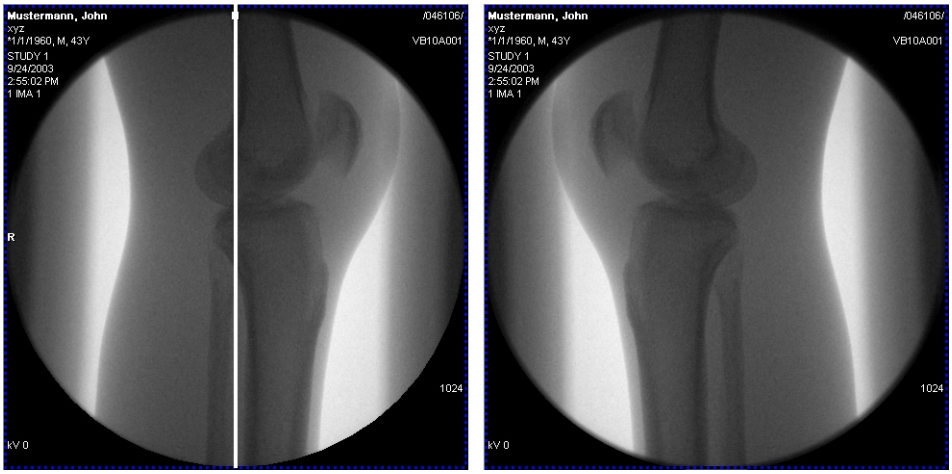
- Place the mouse cursor on the edge of the image and rotate the image to the requested position using the mouse.
  – As long as you keep the left mouse button pressed, the rotation angle is displayed in the lower control area. The first angle indicates by how many degrees the image had already been rotated with reference to the original image. The second angle indicates the current rotation.

Flipping images

The Flip function allows you to compare images of series that were acquired in a different patient position or direction of examination more easily.

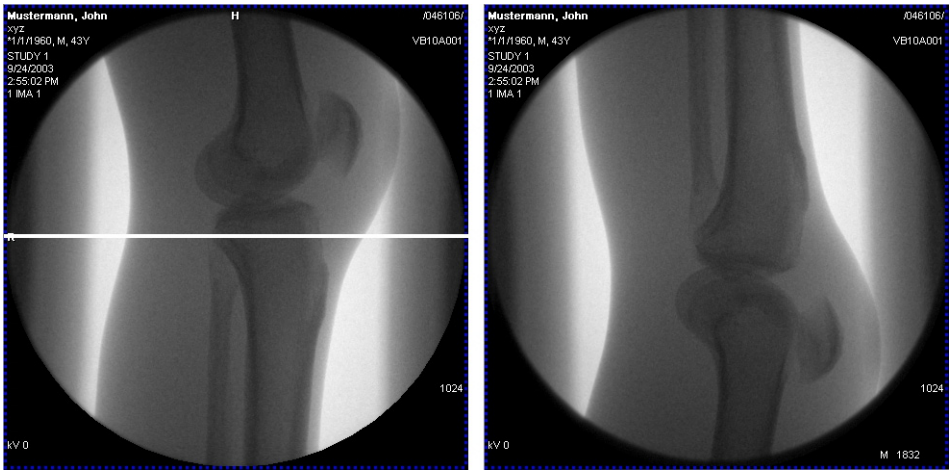
Flipping images vertically

- Select the images that you want to edit.
- Select **Image > Flip Vertically**.



Flipping images horizontally

- Select the images that you want to edit.
- Select **Image > Flip Horizontally**.



The **Viewing** task card provides you with tools for measuring distances, lengths and angles.

Using a shutter, you can limit the region of interest to the necessary detail, excluding all irrelevant areas.

You can annotate images with image texts in order to document your evaluation.

Calibration

If you perform evaluations with distance measurements, you must calibrate the image.

When calibrating, measuring and interpreting values, please note that the acquired images are only a two-dimensional display of three-dimensional objects.

Performing calibration

A calibration object with known measurements (e.g. length, diameter, ...) is necessary to define the longitudinal scale.

The calibration object must be perpendicular to the central beam and within the area of the structure you intend to measure (typically in the center of the measuring field to avoid I.I. distortions).

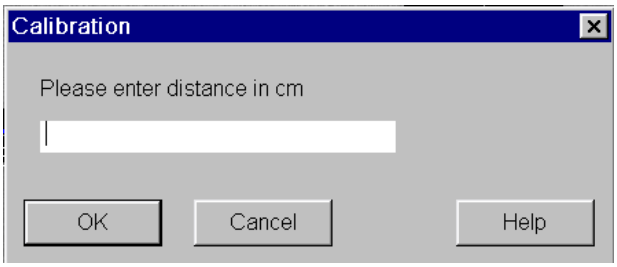
- Select the required image.
- Select **Tools > Calibration**.

— Or —

- Click the **Calibration** button of the **Tools** subtask card.

Drawing a distance line

- Move the mouse cursor into the image.
  – The mouse point changes shape.
- Click on the image to set the starting point and drag a line to the vertex by using the mouse.
  – As soon as you move the mouse, the line is displayed.
- Release the mouse button to finish the line.
  – The distance line is displayed.
  – The **Calibration** dialog box is displayed.



- Enter the distance (in cm).
- Confirm by clicking **OK**.
  – Distance calibration is performed and the calibration factor is displayed in the image.
  – Distances already drawn in the image are updated.

Cancelling calibration

- Click **Cancel**.
  – The previous calibration factor is maintained.

Deleting the distance line

- Select **Edit > Remove Calibration**.
  – The existing distance line is deleted.
  – Instead of the current length, "**??**" is displayed in all measurement graphics.

Measuring distances and angles

You can measure and evaluate distances and angles in images, if the 2D Measurement option is available.

Drawing a distance line, measuring the distance

Using a distance line, you can measure the distance between two points in an image.

When measuring distances near the edge of the image, take into account that the I.I. distortion will result in measurement errors. These depend on the I.I. format. With full format the error of measurement is comparatively large whereas it is considerably smaller with an increasing zoom factor.

Drawing a distance line

- Select **Tools > Distance**.

— Or —

- Click the **Distance** button of the **Tools** subtask card.
  – The mouse point changes shape.
- Place the mouse cursor on the starting point of the distance line.
- Hold the left mouse button down and drag out a line.
- Release the mouse button to finish the line.

Measuring an angle

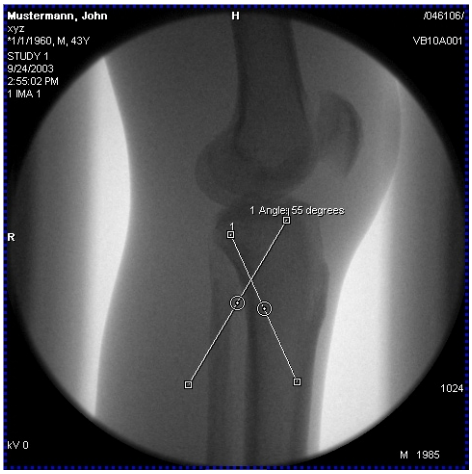
You can define an angle by two lines, the legs of the angle, that you draw on the image. The system then calculates the angle between the two lines drawn in clockwise. If the angle is larger than 180°, the program subtracts 180°.

Drawing an angle

- Select **Tools > Angle**.

— Or —

- Click the **Angle** button on the **Tools** subtask card.
- Place the mouse cursor on a starting point for the first leg.
  – The mouse cursor changes shape.
- Holding the left mouse button pressed, drag a line to the end point of the first leg.
- Draw the second leg in the same way.
  – The two legs of an angle are assigned the same number so you can distinguish several angles unambiguously.



As soon as you start drawing the second leg, the angle is calculated and displayed.

The two lines between which you want to measure an angle do not have to intersect in the image. The program automatically calculates the point of intersection, even if you have not drawn it or if it is beyond the edge of the image.

Changing the angle

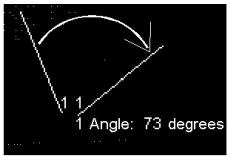
You can change the legs of an angle independently of one another.

- Move the mouse cursor into the image.
  – The shape of the mouse cursor changes at the positions where you can change a leg of the angle.
- Move the entire line or drag an end point to another location.

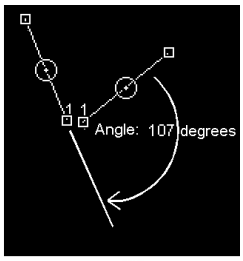
Switching the angle direction

You can also have the complementary angle displayed (difference of 180° - angle measured).

- Select the angle.
- Select **Other Angle** from the context menu (right mouse button).
  – The angle is now measured counterclockwise and the new value is displayed.



(1)



(2)

(1) Angle between the legs

(2) Complementary angle

If the angle approximates to 90°, 180°, 270°, it is not clear whether the angle between the legs or the supplementary angle has been drawn.

Therefore, annotate the angle when you display the supplementary angle.

Setting a shutter

You can hide irrelevant areas of the image. To do that, you place a shutter over the image.

After that, only the area within the shutter is displayed and all the surrounding areas appear black.

Only one shutter can be set in an image or scene. When setting different shutters in different frames of a scene, the shutter in the first frame is taken into account.

Setting a shutter

- Select **Tools > Shutter**.

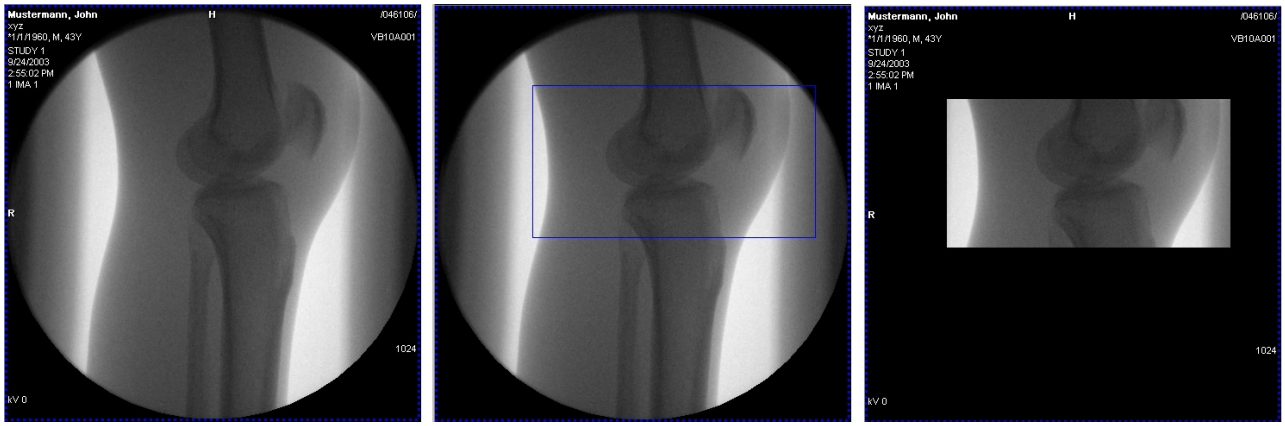
— Or —

- Click the **Shutter** button on the **Tools** subtask card.

- Place the mouse cursor in the area of the image that you want displayed.
  – The mouse cursor changes shape.
- Hold the left mouse button pressed and drag a rectangle open for the shutter.

By clicking on the border of the image you can select a shutter which you can then move or resize.

- Release the mouse button.
  – The area outside the shutter is displayed black.



Removing the shutter

- Click on the border of the shutter.
  – The shutter is selected.
- Press the **Del** key on your keyboard.
  – The image is displayed in its original size again.

Images of a scene always have the same shutter. If they are moved or resized, that change is applied to all images.

Text in images

You can annotate interesting or anomalous areas in an image.

Some modalities also allow you to store comments with an acquisition series. These comment texts are also displayed in the images and can be altered.

Annotating images

You can anchor image text with a special image detail.

Caution

As opposed to image comments, modifications in medical images are not saved automatically. In case of a user switch where the new user does not have adequate access rights, modifications of the image text may also be lost.

Image modifications may be lost.

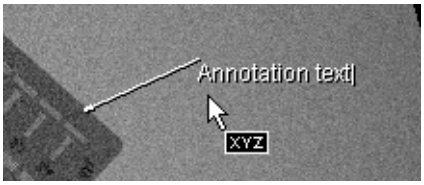
- Select **Patient > Save...** in order to save the image comment and **Patient > Save as...** to save the image with modifications as a new image.

- Select **Tools > Annotation Arrow**.

— Or —

- Click the **Annotation Arrow** button on the **Tools** subtask card.
  – The mouse cursor changes shape.

◆ Click into the image where you want to place the annotation and draw an arrow, keeping the left mouse button pressed.
– The text cursor is at the end of the arrow.



Annotation text

◆ Enter the desired text.

◆ Confirm your text entry with the **Enter** key.

— Or —

◆ Click into the image outside the text.
– The text is displayed white with shading.

Using predefined text

Frequently used texts can simply be selected from a list once they have been configured.
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◆ Select **Tools > Annotation Arrow**.

◆ Using the right mouse button, click on the position in the image where you want to insert the text.
– A selection list with predefined texts is displayed.

◆ Select an entry from the list by clicking it once. If necessary, use the scroll bar to display further texts.
– The text appears immediately.

Positioning text

Entered texts can be moved as required.

◆ Click on the text with the left mouse button.
– The text is marked by small squares.

◆ Drag the text to the new position.

Editing text

Previously entered image annotations can be changed at any time.

- Click on the text with the left mouse button.
  – The text is marked by small squares. The text cursor is at the beginning of the text.
- Now change or add to your text.
- You can finish text editing by clicking into the image outside the text frame or by pressing the **Enter** key.

Deleting text

Texts can be deleted individually or together with other graphic elements.

- Select one or several (**Ctrl** key) text elements.
- Press the **Del** key on your keyboard.
  – The selected texts are deleted.

Unlike bones for example, vessels do not show a considerably greater absorption of X-rays compared to the surrounding tissue. In X-ray exposures vessels are not especially highlighted.

When subtraction (DSA) is performed, two X-ray exposures are acquired of the region of interest, one with contrast medium and one without contrast medium. Afterwards both exposures are subtracted.

In the subtraction image, areas with the same attenuation and areas with a (slightly) different attenuation, e.g. vessels that were filled with contrast medium during the exposure, can be discerned clearly.

When the DSA option is installed, the following functions are available to optimize subtraction images.

❏ Anatomical background

❏ Pixelshift

Loading and displaying images

Native images of previous examinations acquired in the Subtraction mode (option) or Roadmap mode (option) are stored in the local database or in your archive together with the subtraction images. Both image types can be displayed simultaneously on both monitors.

◆ Load the images of the required patient into the **Viewing** task card using the **Patient Browser**.

◆ Select **SUB > Sub/Native Display** in the main menu of the **Viewing** task card.

— Or —

◆ Click this button in the **SUB** subtask card.
  – In the **Viewing** task card the subtraction images are displayed on the left monitor.
  – In the **Native** task card the corresponding native images are displayed on the right monitor.

Selecting another mask

You can select an image without contrast medium (mask) that you want to subtract from a stack of images acquired with contrast medium. To do this, scroll simultaneously through the stacks of subtraction images.

Selecting the next mask

◆ Select **SUB > Mask Next** in the main menu of the **Viewing** task card.

— Or —

◆ Click this button.
– The next mask is selected.

Selecting the previous mask

◆ Select **SUB > Mask Previous** in the main menu of the **Viewing** task card.

— Or —

◆ Click this button.
– The previous mask is selected.

Adding the anatomical background

Normally the anatomical surroundings of vessels of interest are not visible in images that are displayed subtracted. By adding the mask image, the surrounding tissue can be highlighted more or less. The initial degree of admixture is defined in the examination set. This value can be modified.

◆ Select the required image.

◆ Using the mouse, drag the slider to the required position.

You can set the anatomical background between 0 % and 30 %.

– The selected image is displayed with anatomical background.

Achieving exact covering of image and mask

During acquisition of the subtraction series, the patient or the C-arm system may move. The images that are to be subtracted may not be congruent. The anatomical background, especially in the area of image contrasts, is thus not cancelled out.

Exact covering of image and mask (= image without contrast medium) can be achieved if you shift the mask by single pixels.

There are two possibilities for pixelshift:

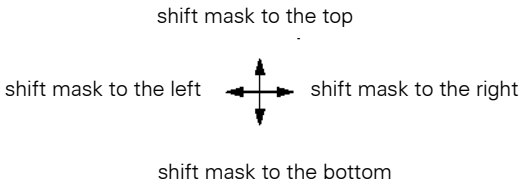
❏ Manual pixelshift
Shift the mask manually until the best result is achieved.

❏ Automatic pixelshift
Define an area (ROI) for which pixelshift is to be optimized. The ROI can be defined in one image or in a series of images in a stack. The best result is automatically calculated for this area.

Manual pixelshift

◆ Click this button.
– The button is displayed selected.
– The mouse point changes shape (arrow).

◆ Move the mouse cursor in the image keeping the left mouse button pressed down.
– The mask is shifted simultaneously (in small steps).



To shift the mask in big steps, move the mouse pointer at the edge of the image. For fine mask shifting, move the mouse pointer in the center of the image.

◆ Click this button again.
– The pixelshift function is switched off. The button is displayed deselected.

Automatic pixelshift

- Click this button.
  – The button is displayed selected.
  – The mouse cursor changes into a rectangle.
- Move the rectangle to the position in the image where misalignment is most evident.
- Click this position in the image.
  – The mask is moved so that subtraction for the area within the rectangle is optimized.

Saving, transferring, documenting, closing images

After image processing, when all the images have been displayed in an optimum way and have been evaluated, you can save, archive or transfer these images to the Filming task card for further evaluation and documentation.

After that, you can close the images of this patient and make space in the **Viewing** task card for the images of the next patient.

Saving images

After you have completed processing and evaluation of the images, you save your results.

You can save your images in one of two ways:

❏ You can save the processed images in a new series, or

❏ you can add the images to an existing series.

Note that the newly saved data may not immediately be shown in the **Patient Browser**. *The display should first be updated manually, in particular after comprehensive storage processes (select* **View > Update** *in the* **Patient Browser**).

Calling up the Save As dialog box

Only images of the same study can be saved together in one series.

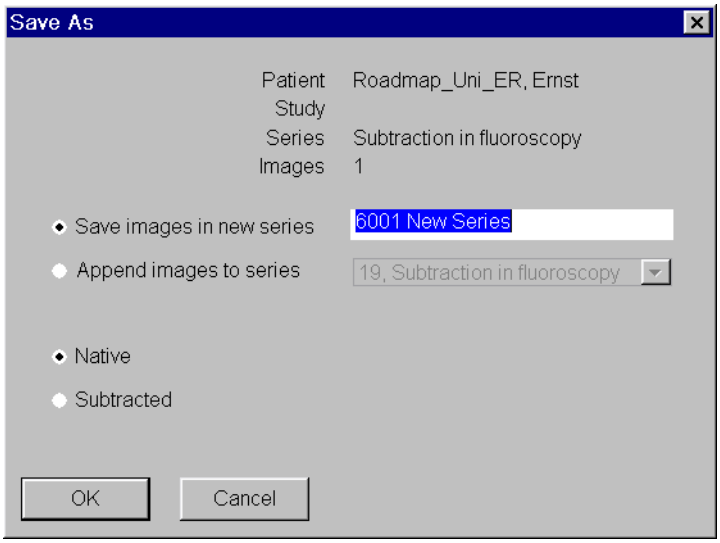
◆ First select the images or series that you want to save.

◆ Select **Patient > Save As**.

– Or –

◆ Click the **Save as** button in the **Save/Undo** subtask card.

– The **Save As** dialog box is displayed.



Saving images as a new series

You can save all selected images in a new series. The old series remains unchanged. You can then easily compare processed and evaluated images with the original images of the study.

- Click the **Save images in new series** option in the **Save As** dialog box.
- Enter a new description for the series in the text input field.
- For images of a subtraction or Roadmap study, select the image type.
  – **Native**: The original data set (native images and additive image of the mask, without subtraction image) is saved.
  – **Subtracted**: Only the subtracted images are saved. Subtraction functions can no longer be performed with these data.
- Confirm by clicking **OK**.
  – The images are saved in a new series.

Appending images to an existing series

If you do not want to create a new series for your processed and evaluated images, you can append them to an existing series.

- Click the **Append images to series** option in the **Save As** dialog box.
- Select the series from the selection list using the series number and description.
- For images of a subtraction or Roadmap study, select the image type.
  – **Native**: The original data set is saved.
  – **Subtracted**: Only the subtracted images are saved. Subtraction functions can no longer be performed with these data.
- Confirm by clicking **OK**.
  – The images are saved in the specified series.

Restoring image display

You can reset modified image processing parameters (e.g. window values, edge filter, zoom/pan) in order to reapply the values that were valid when you last saved the image. This will also reset any image evaluation steps (e.g. shutter or measurements) that were performed after the relevant image was last saved.

- Select the images in the image area of the **Viewing** task card.
- Select **Edit > Reset all**.

– Or –

- Click the **Reset all** button in the **Save/Undo** subtask card.
  – All selected images are reset to their original state (before they were processed).

Archiving, sending or filming images

After an examination or postprocessing, the images are stored in the local database from where they can be accessed for reporting or documentation, for example.

Archiving images

Using the **Archive To...** function, you can save patient and examination data to an archive via the network (only DICOM option).

Please note that CDs are not archive media. Saving and keeping data on CD-RWs does not comply with archiving requirements.

For images of a subtraction or Roadmap study, you can select whether you want to archive native images or only the subtracted images.

- Select the images that you want to archive.
- Select **Transfer > Archive To...**.

– Or –

- Click this button in the **Transfer** subtask card.
  – The **Archive To** dialog box is displayed.
- Select the required archive destination.

- Click **Archive**.
  – The data are archived to the selected destination.
  (→ Register Filming/Printing and Archiving, Page 66)

Sending images (DICOM option)

If your system is connected to a network, you can send patient and examination data to other workstations via the network using the **Send To....** function.

For images of a subtraction or Roadmap study, you can select whether you want to send native images or only the subtracted images.

Sending images to node 1

- Select the data that you want to send.
- Select **Transfer > Send to Node 1**.

– Or –

- Click the corresponding button in the **Transfer** subtask card.
  – The data are sent to the selected address.

Sending images to a specific network address

- Select **Transfer > Send To...**.

– Or –

- Click the button in the **Transfer** subtask card.
- Select the required network address(es) in the **Send To** dialog box.

- Click **Send**.
  – The selected data are sent to the required address(es).

Filming images

You can also use the **Viewing** task card to select images and copy them to **Filming** (DICOM option).

Transferring images to Filming

- Select the images in the image area of the **Viewing** task card.
- Select **Patient > Copy to Film Sheet**.

– Or –

- Click the corresponding button in the **Filming** subtask card.
  – All the selected images are transferred to the "virtual film sheet" (**Filming** task card or **Film Preview** window). There you activate the **Auto Expose** option, and the images are exposed on film or printed on paper as soon as the film sheet has been filled, or they are first collected in a film job.

Exposing images on film

Patient images that you have collected in a film job can be printed or exposed from the **Viewing** task card. To do that, you do not need to switch to the **Filming** task card.

- Select **Patient > Expose Film Task**.

– Or –

- Click the button in the **Filming** subtask card.
  – All images of the film job are transferred to the camera.

Transferring images to the References task card

In the **Viewing** task card, you can transfer images to the **References** task card.

- Select the images or series you want to process in the **Viewing** task card.

- Click the button in the **References** subtask card.
  – The images are copied to the **References** task card.
  (→ Register Examination, Page 27)

Closing the patient

When you have finished image processing and evaluation in the **Viewing** task card, you can close the patient. If images of several patients are loaded, you can close all patients in one step.

If images of a current examination are loaded, the patient will be closed when the examination is ended. This can also be initiated in the **Viewing** task card.

Closing the patient

◆ Select **Patient > Close Patient**.
– The current patient folder is closed.

Or

◆ Select **Patient > Close All**.
– All patient folders are closed.

The images are unloaded from the **Viewing** task card.
You can now load images of another patient for postprocessing.

Ending an examination

◆ Select **Patient > End Examination**.

— Or —

◆ Click the **End Examination** button in the **Patient** subtask card.

The images are unloaded from the **Viewing** task card and the examination is ended.
You can now register the next patient for examination.

Viewer Configuration

In the **Viewer Configuration** window, you can adapt the user interface and program operation of the **Viewing** task card to your method of working.

You can change and make the following settings:

- ❏ Standard layout of the image area of the **Viewing** task card
- ❏ Generation of annotation text
- ❏ Presettings for saving Sub/Roadmap image data
- ❏ Standard layout of the image area of the **References** task card
- ❏ Behavior of reference images during loading
- ❏ Settings for image text display (configuration via image text editor)

Calling up the configuration window

The configuration window is called up from the syngo **Configuration Panel**.

- ◆ Select **Options > Configuration** in the main menu.

Viewing

- ◆ Double-click the **Viewer** button.
  – The **Viewer Configuration** window appears.

Or

ImageText

- ◆ Double-click the **Image Text Editor** button, if you want to configure image text display.
  – The **Image Text Configuration** window is displayed.

Concluding configuration

If you have changed the settings in the cards of the configuration window, you must confirm them. If you have changed parameters by accident, you can reset these values to default values or reject all your changes.

Applying changes

◆ Confirm by clicking **OK**.
– All changes are applied.
– The **Viewer Configuration** dialog window is closed.

Or

◆ Click **Apply**.
– The changes of the current card are applied.
– The **Viewer Configuration** dialog window remains open.
– The changed settings are automatically applied the next time you load data into the **Viewing** task card.

Reset to default settings

◆ Click **Reset to Default**.
– The values of the current card are reset to standard values.
– The **Viewer Configuration** dialog window remains open.

Discarding changes

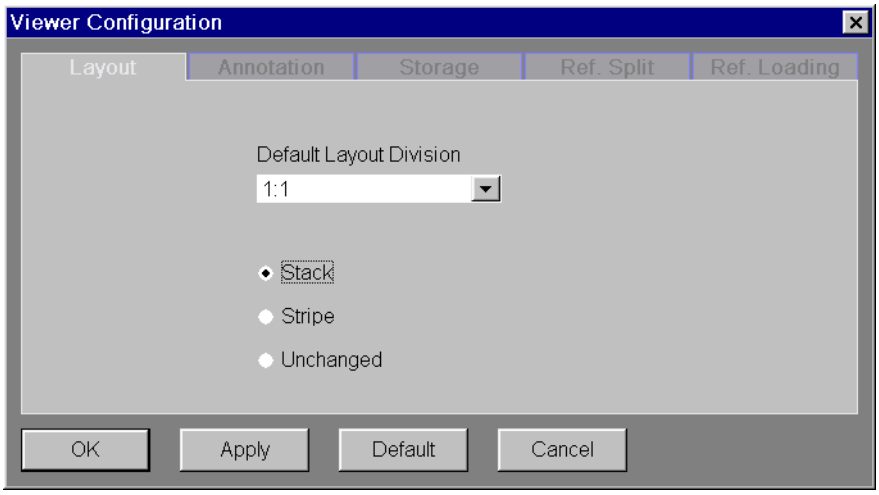
◆ Click **Cancel**.
– The changes are not applied.
– The **Viewer Configuration** dialog window is closed.

Division of the image area

On the **Layout** card, you define the number and size of the segments in the image area.

The standard layout is 1:1 (full screen). This is the most suitable layout for detecting diagnostic details. For overview purposes you can set a layout with several images per page (4:1, 9:1 or 16:1).

Changing the size of the layout



- Click the **Layout** card into the foreground.
- Select the size of the layout from the selection list.
  – After the images have been loaded into the **Viewing** task card, they are displayed in the selected layout size.

Setting the type of layout

- Click the **Stripe** option.
  – You can view the loaded series of a study one after the other image by image.

Or

- Click the **Stack** option.
  – All images of a series are now arranged in a stack one on top of the other.

Or

- Click the **Unchanged** option.
  – All images are displayed in the type of layout that was used last.

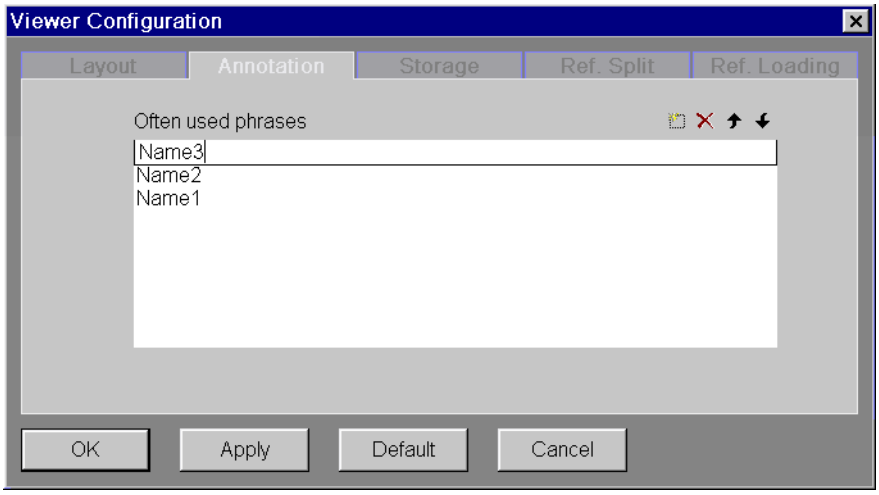
Stack is the default setting for the layout type.

Creating annotation texts

Texts that are often used can be created on the **Annotation** card. You can also delete texts or change existing annotations. The texts created must not exceed one line and 50 characters.

The entered texts are available for selection, if you have enabled the **Tools > Annotate** *function in the* **Viewing** *task card and then click into the image with the right mouse button.*

Creating a new text



- Click the **Annotation** card into the foreground.
- Click the **Paste** button.
- Double-click the empty box.
- Enter the new text.
- Click the **Paste** button or press the **Enter** key.
  – The new annotation text is placed in the top position of the list.

Changing text

- Double-click an existing box.
- Enter the new text.
- Click the **Enter** button.
  – The modified annotation text is displayed.

Deleting an existing text

- Select a text in the list of annotation texts.

- Click the **Delete** button.
  – The selected text is deleted.

Moving texts

- Select a text in the list of annotation texts.

- Click the **Move up** button.

— Or —

- **Drag&drop** the text to the required position.
  – The selected text is moved up one line.

Or

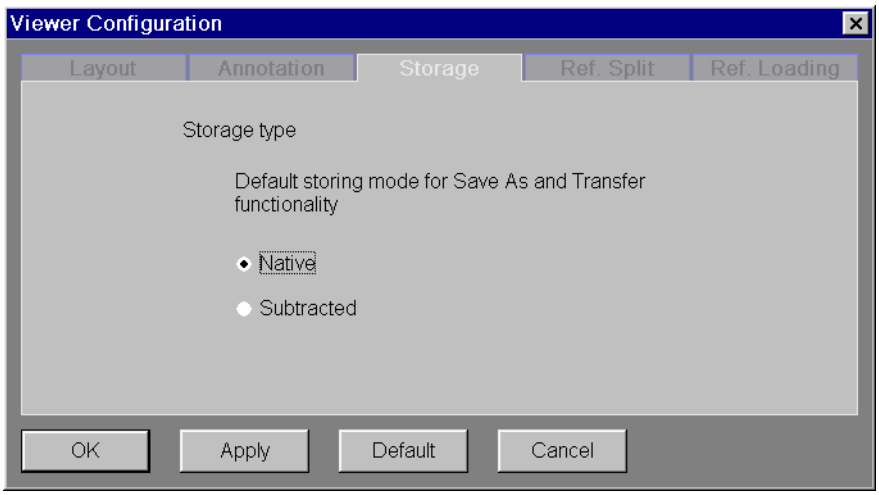
- Click the **Move down** button.

— Or —

- **Drag&drop** the text to the required position.
  – The selected text is moved down one line.

Saving Sub/Roadmap image data

In the **Save** card you define the presetting for the **Save as** dialog. The setting is for saving images of a subtraction or Roadmap examination and is used as default for exporting and sending images via the **Transfer** menu.



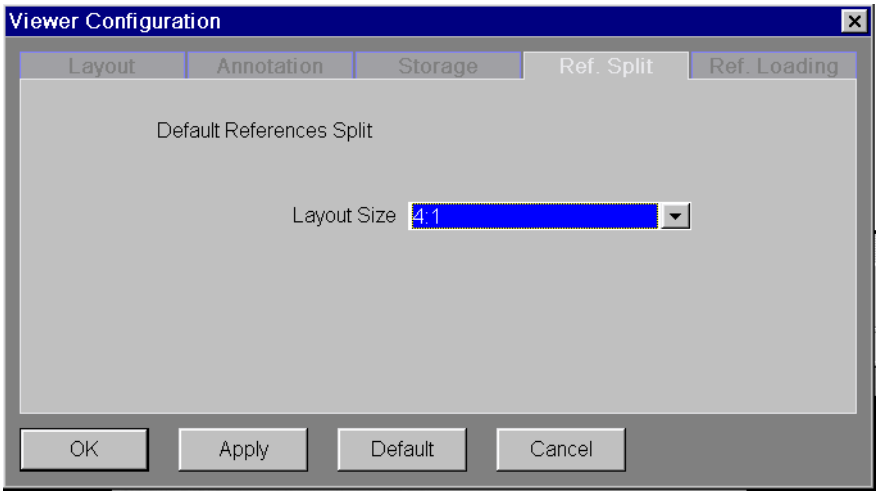
- Click the **Save** card into the foreground.
- Click the **Native** option.
  – The original data set will be saved by default.

Or

- Click the **Subtracted** option.
  – Only the subtracted images will be saved by default. Subtraction functions can no longer be performed with these data.

Setting the layout in the References task card

In the **Ref. Split** card you can define the division of the image area, when images are loaded in the **References** task card.



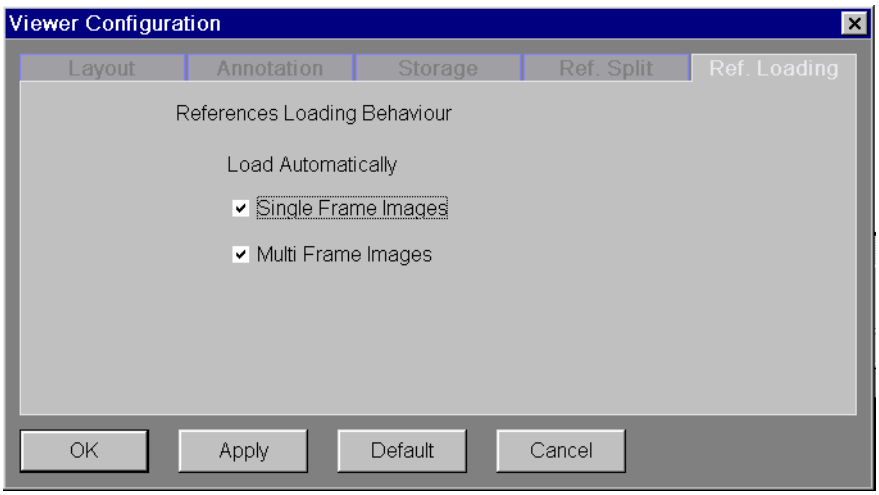
- Click the **Ref. Split** card into the foreground.
- Select the size of the layout from the selection list.
  – Loaded images are displayed in the selected layout size in the **References** task card, if the **Monitor split** button is selected at the C-arm system.

You can set the following layout sizes: 4:1, 9:1, 16:1, Automatic.

The standard setting for the layout size is 4:1.

Loading reference images during an examination

In the **Ref. Load** card you can define whether single images/scenes stored during an examination are automatically loaded into the **References** task card.

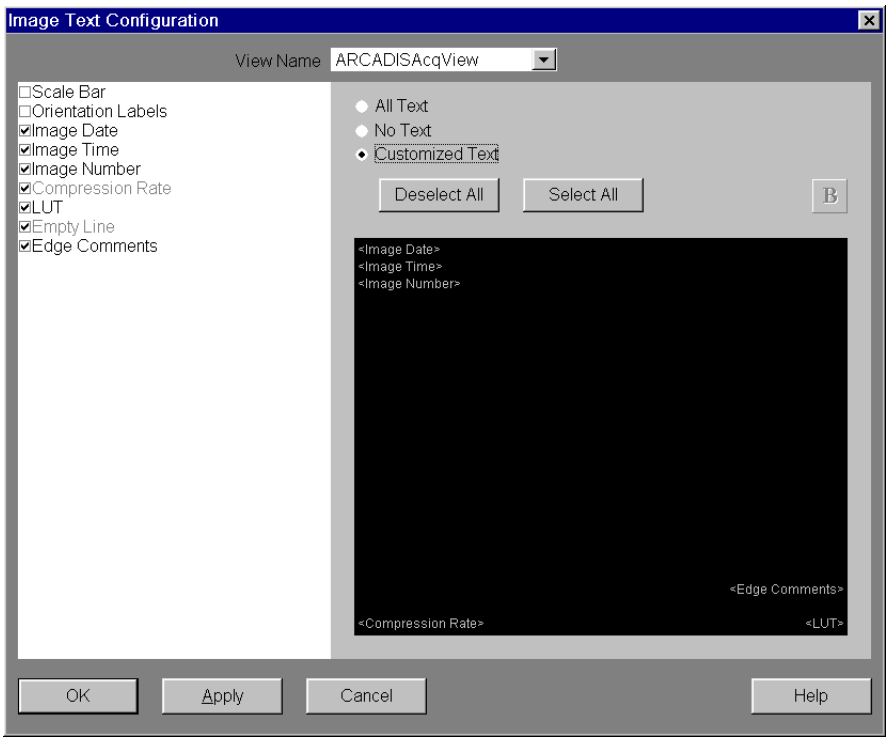


- Click the **Ref. Loading** card into the foreground.
- Click the **Single Frame Images** check box.
  – Single frames are automatically loaded into the **References** task card during an examination.
- Click the **Multiframe Images** check box.
  – Multiframe images (scenes) are automatically loaded into the **References** task card during an examination.

In the default setting, both check boxes are activated.

Configuring image text display

In the **Image Text Configuration** dialog you can set which image text information is to be displayed by default with individual basic formats. The dialog box is opened by clicking the Image Text Editor button in the syngo **Configuration Panel**.



- In the **View Name** selection list, select the basic format for which your configuration settings apply.
- Select either **Full Text** or **No Text**.
  – By default, all available image texts or no image text are/is displayed.

Or

- Click **Customized Text** and select the required information from the column on the left.
  – By default, the selected image texts are displayed.

SIEMENS

Operator Manual
ARCADIS Orbic

3D Option

SP

SPR2-320.620.01.02.02

Please observe the

Safety register

This must be studied thoroughly before system startup.

The original version of this Operator Manual was written in the German language.

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SP

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3D Option

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Introduction

The 3D option essentially consists of motor control of the orbital movement, which can be switched on optionally, and a task card for 3D image reconstruction and visualization.

This enables a fixed number of fluoroscopic images to be acquired at fixed angular distances during automated continuous orbital rotation through 190°. In the isocenter, a data cube of approximately 11 cm edge length that consists of isotropic submillimeter voxels is calculated from these images.

The 3D information is available directly after the 3D scan and is visualized by multiplanar reformatting (MPR) or surface shaded display (SSD) with the aid of the *syngo* interface.

The conventional, manual use of the ARCADIS Orbic C-arm for generating 2D projections continues to be possible without any restrictions.

Areas of application

The 3D option of the ARCADIS Orbic is suitable for intraoperative use for bones and joints of the lower and upper extremities, the entire spine, the hip and pelvic region and facial bones.

In case of extremely adipose patients or patients with highly osteoporotic bones, loss of image quality may occur in the area of the thoracic and lumbar spine.

The positioning of extremely adipose patients and the resulting limited movement range of the C-arm can make an integrative application in the area of the thoracic and lumbar spine impossible.

Only radiolucent positioning accessories may be used for the application, since metal parts of the OR table that are in the beam path will cause loss of image information.

Calibration

During the installation of the 3D option each system is calibrated by Siemens Customer Service.

It is necessary to check calibration as soon as *one* of the following criteria is fulfilled:

- ❏ the last calibration dates back 6 months
- ❏ since the last calibration 150 patients have been examined
- ❏ since the last calibration 400 3D scans have been performed

Calibration is an important prerequisite for achieving good image quality. Subsequent changes to the initial values, e.g. due to the replacement of system components, require recalibration by a Siemens service engineer.

If the NaviLink 3D option is used, the calibration of the system should be checked at shorter time intervals, together with the navigation system. If necessary, the system must be recalibrated.

Caution

System calibration provides good results only within an angulation range of ± 20°.

Outside the range image quality deteriorates. An error message is displayed.

- ◆ It is important to adhere to this range since otherwise an error message appears and image quality will deteriorate.
- ◆ If additional weight is attached to the C-arm, the system must be recalibrated.

NaviLink 3D Option

The NaviLink 3D option of the ARCADIS Orbic is an extension of the 3D software for this system. It provides an interface for automatic registration of the 3D data set for different navigation systems. The interface only supports optical systems.

The navigation system has to register the position of the C-arm in the starting position during a 3D scan. After the scan the 3D image data are directly transferred to the navigation system.

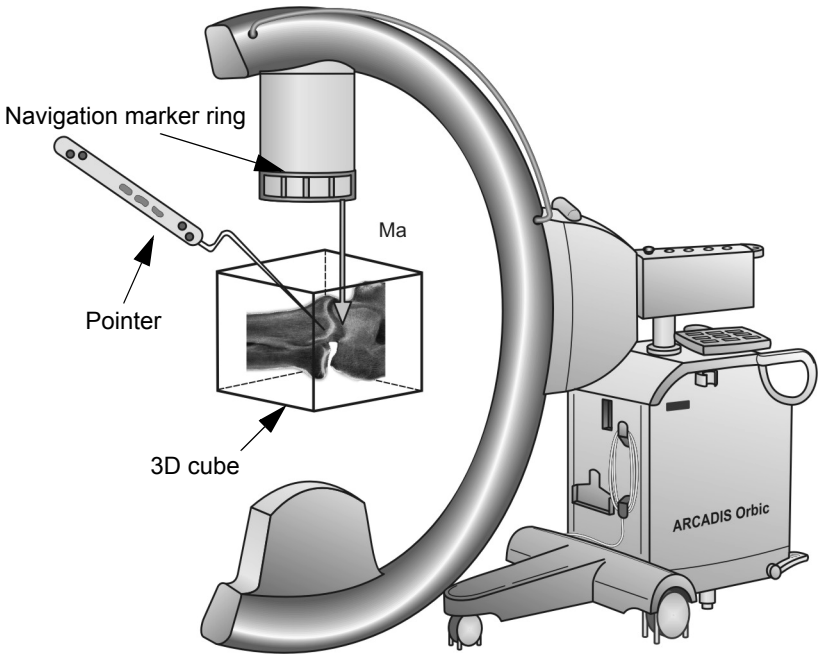
Connection to the navigation system

There must be a network connection to the navigation system. This can be either via the hospital network or a direct connection to the navigation system.

A direct connection is preferrable. In case of a connection via the hospital network, malfunctions may occur due to network overload.

System illustration

The illustration shows the relation of the C-arm to the acquired 3D data set (cube). The matrix "Ma" points from the navigation marker ring to the cube and thus determines the exact position and orientation of the cube. This matrix is stored together with the 3D data set.



Navigation marker ring (registration unit)

- ❏ There are registration units which are permanently mounted to the image intensifier. These can only be dismantled by service personnel of the navigation company.
- ❏ There are registration units which are not permanently mounted. These can be mounted and dismantled by hospital staff.

Data transfer to the navigation system

Data are transferred to the navigation system automatically at the end of the 3D scan.

Safety information

- ❏ The material required for navigation must be removed from the beam path for normal operation.
- ❏ Before using the I.I. interface, make sure the interface is clean and not damaged (visual check).
- ❏ After a recalibration in 3D mode, a recalibration must also be performed with the configured navigation systems.
- ❏ Prior to performing an operation with a navigation system, the user has to make sure that the navigation system is sufficiently accurate.
- ❏ Please also observe the safety information contained in the supplement "Operator Manual for the Installation of Dedicated Options".
- ❏ For distance and angle measurements in 3D images, a tolerance of ± 2 % for an inner cube of 7 cm x 7 cm x 7 cm applies.

Troubleshooting guide

Error message "Communication to navigation system failed. Check navigation system and network connection".

Possible error cause	**Troubleshooting possibilities**
Error at the navigation system	Check for an error message from the navigation system
No connection	Verify there is a connection to the navigation system
Connection is interrupted	If connected by local area network (LAN): Check the function of the local area network For direct connection: Replace the connecting cable
Incorrect navigation system selected in the orientation dialog	Verify that the navigation system you have selected corresponds to the navigation system in use

Error message: "Registration failed. Check navigation system."

Possible error cause	Troubleshooting possibilities
Error at the navigation system	Check for an error message from the navigation system
The navigation camera cannot see the marker ring on the I.I.	Check for an error message from the navigation system Correct the camera position

Error: Bad accuracy

Possible error cause	Troubleshooting possibilities
Error at the navigation system	Check whether sufficient accuracy is ensured without automatic registration: If not: Call Service for the navigation system If yes: Check the following points
A wrong navigation marker ring is mounted on the I.I.	Verify that the marker ring (registration unit) corresponding to the navigation system in use is mounted on the I.I.
The navigation marker ring is not mounted correctly on the I.I.	Verify that the marker ring is mounted correctly
The adapter ring at the I.I. is dirty	Clean the I.I. and the adapter ring at the C-arm system
The I.I. is damaged	Call Siemens Service
The navigation marker ring is damaged	Call Siemens Service
The C-arm is damaged	Call Siemens Service
Poor image quality in 3D	Call Siemens Service

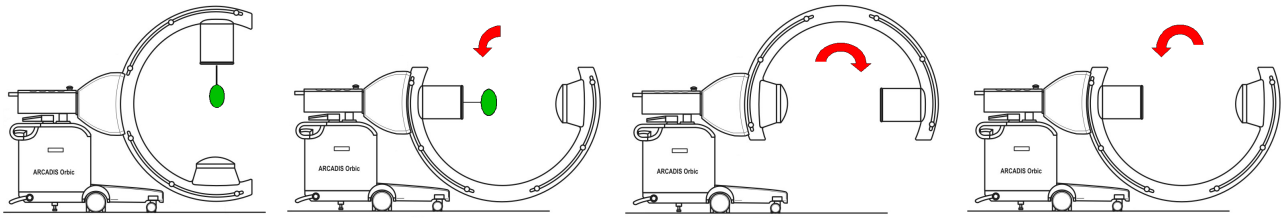
Error: Navigation system cannot be selected

Possible error cause	Troubleshooting possibilities
The navigation system is not configured at the Siemens C-arm	Call Siemens Service for the configuration of the navigation system
Incorrect navigation system selected in the orientation dialog	Verify that the navigation system you have selected corresponds to the navigation system in use

Error message at the navigation system

Possible error cause	Troubleshooting possibilities
Error at the navigation system	Please refer to the user manual of the navigation system

Sequence of 3D scans



1. Horizontal adjustment | 2. Vertical adjustment -90° | 3. Test run +190° manual | 4. 3D scan -190° motorized

The procedure is described in detail below.

Adjustment

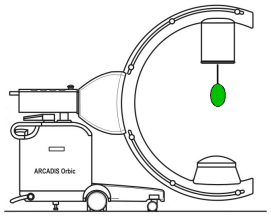
Always move the object to be examined into the isocenter.

There are three methods of adjustment:

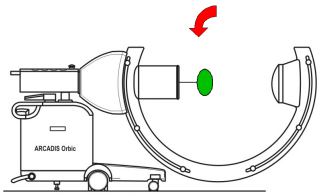
1. With the I.I. laser aimer

◆ Proceed as follows:

1. Horizontal adjustment



2. Vertical adjustment -90°



◆ Then lock all brakes, because otherwise the system will display an error message.

2. With the I.I. laser aimer and the horizontal light localizer (option)

In contrast with the first method, it is not necessary to move the C-arm.

For details, see the separate operator manual for the "Horizontal Laser Light Localizer".

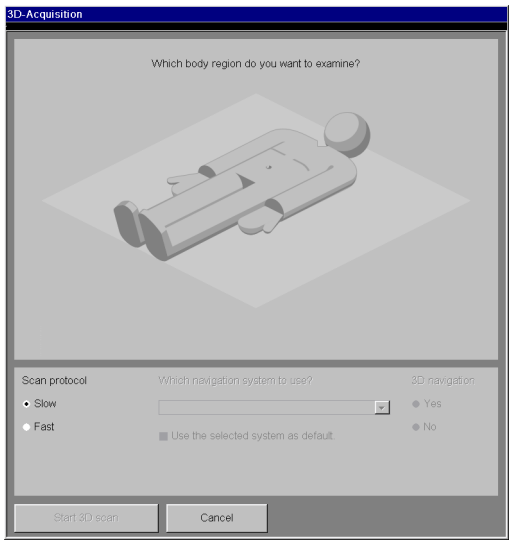
3. With the single-tank laser targeting device

In contrast with the first method, the C-arm must be rotated through 180°.

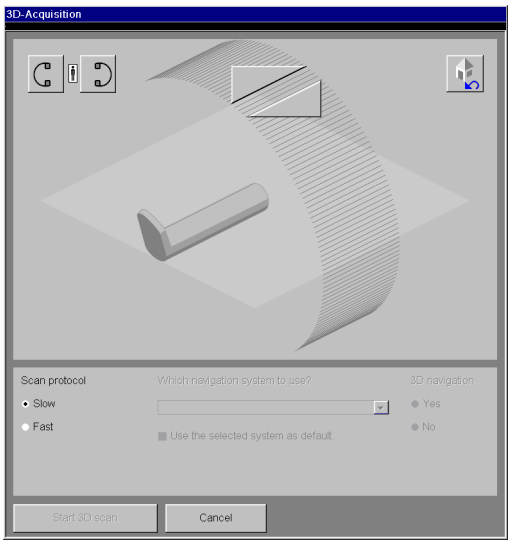
Setting the orientation

Before you can perform a valid test run, you must determine the patient position in relation to the system.

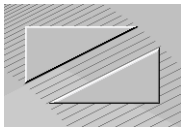
- Press this button in the control area of the **Examination** task card.
  - The **Acquisition** dialog box is opened. You are requested to select the body region for the examination.



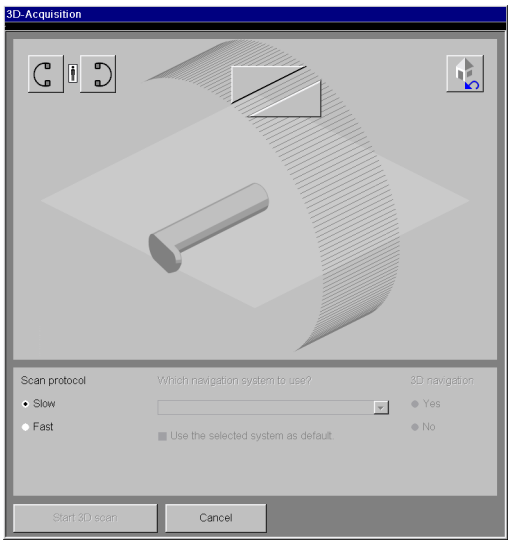
- Click on the body region to be examined in the image.
  - The other body regions are hidden and new operating elements are shown.



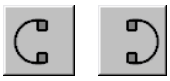
Example: left leg



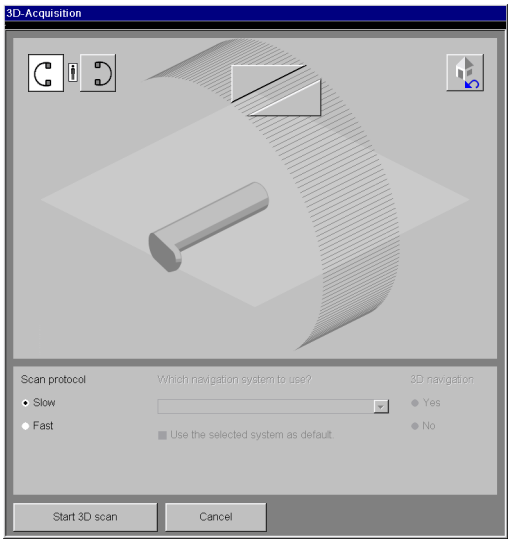
◆ Use the arrow keys to set the actual position of the patient on the operating table.

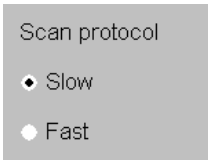


Example: left leg, turned to the left



◆ Define the position of the C-arm in relation to the patient (system orientation).
  – Now the position of the body region to be examined in relation to the system is uniquely defined. The "Start 3D scan" button is active.





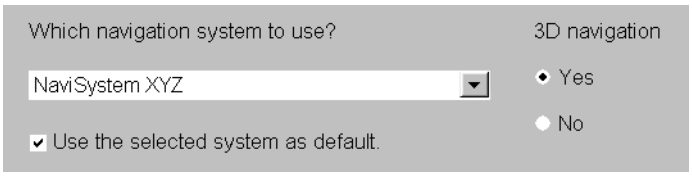
◆ Check the scan speed setting and change the option, if necessary.

❑ slow = 100 images per scan, high image quality

❑ fast = 50 images per scan, lower image quality

Settings for 3D navigation

If you are working with the navigation system (NaviLink 3D option), the correct navigation unit must be selected.



- Check the selection of the navigation system and change it, if necessary.

The navigation unit must be ready for operation and ready to receive.

- If you want the selected navigation system to be the default setting in the selection list, acivate the **Use the selected system as default** check box.
- Select **Yes** under **3D Navigation**.

Starting the test run

- To start the test run, click **Start 3D scan**.

Test run (collision monitoring)

Warning

Automatic 3D run.

Danger of collisions.

- Before starting a 3D test run, a manual test run **must** be carried out.

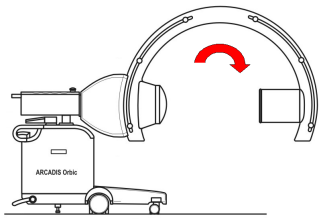
Warning

Released brakes during the test run.

Danger of collisions.

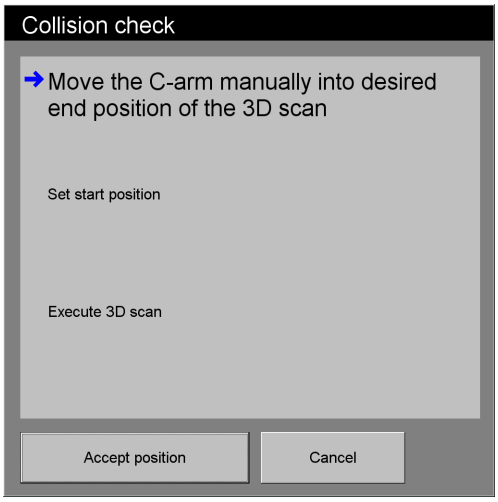
- Before a test run is carried out, please ensure that all brakes are locked, except the orbital brake!

3. Test run +190° manual



You have defined both the patient orientation and the system orientation in the **Acquisition** dialog window and started the test run.
(→ Page 14)

Thereupon the collision check window is displayed, prompting you to perform the first step for the test run.



If the C-arm is already in the end position after the adjustment has been carried out, you are prompted to perform the second step for the test run.
(→ Page 19)

There are two possibilities for the first step of the test run:

❏ Full scan (scan range = 190°)

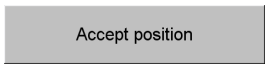
❏ Quick scan (120° ≤ scan range < 190°)

Full scan (scan range = 190°)

◆ Move the C-arm manually from the current position into the preset end position of the C-arm.

Quick scan (120° ≤ scan range < 190°)

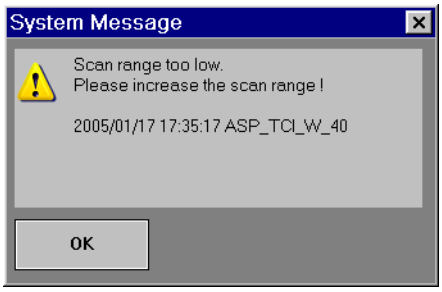
◆ Move the C-arm manually from the current position into the end position selected by you (at least 120°).



◆ Click **Accept position** to confirm the set end position.

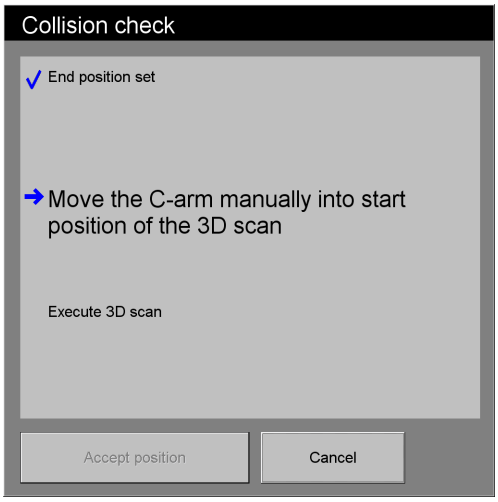
Please note that with a limited scan range, image quality is also limited.

If you fall short of the minimum scan range of 120°, the following error message will appear:



Completing the test run

When you have set the end position, you are prompted to perform the second step of the test run:



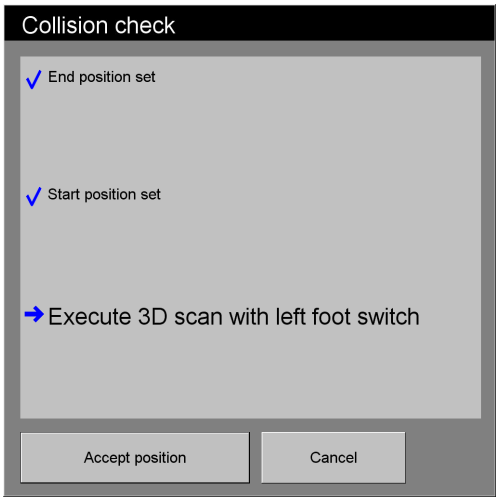
- Move the C-arm manually to the start position for the 3D scan.
  – The test run is completed and the system is ready for the 3D scan.

Warning

Released brakes.

Danger of collision.

- Make sure that all brakes are locked!



Warning

Changed settings of the C-arm or system for the 3D run.

Danger of collision.

- After the test run, you must **not** change the position of the C-arm or change any settings of the entire system.

After the test run, you have a maximum of 4 minutes to carry out the 3D scan.

3D scan

Warning

Starting the 3D scan.

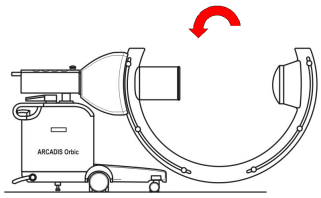
Danger of radiation.

- Please observe the radiation protection notes (→ Register Safety, Page 18).

- After the test run has been successfully completed, start the 3D scan by actuating the left footswitch.
- Make sure that you press the footswitch during the scan (up to 1 minute, depending on the selected image quantity) (deadman's switch)

It is not possible to interrupt the 3D scan for image quality reasons.

4. 3D scan - 190° motorized



End position

Warning

For the duration of the scan, the orbital movement of the C-arm is motorized.

Crushing hazards.

- Maintain a sufficient safety distance.

Caution

A brake is released or the C-arm is adjusted during the run.

The scan becomes useless.

- Brakes must not be released during the run or the scan, and the C-arm must not be adjusted!

Caution

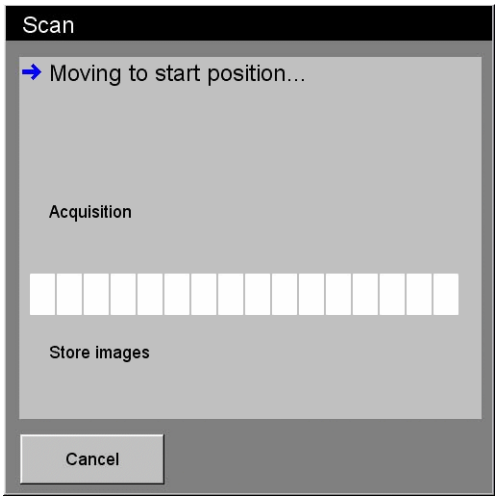
Patient moves during the scan.

Image quality loss!

- Make sure that the patient does not move during the scan!

Run dialog

As long as you continue to press the footswitch, the C-arm moves to the starting position. The following window is displayed:



Registration position (only with NaviLink 3D option)

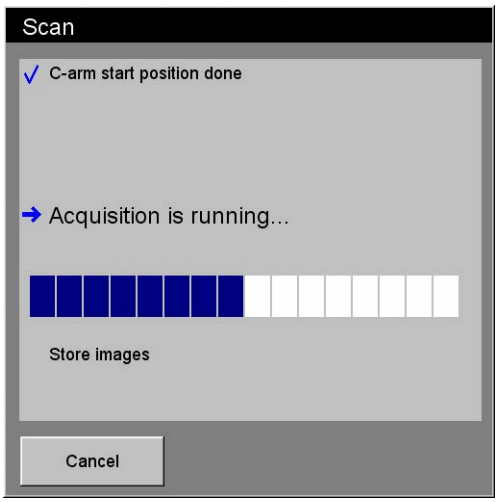
The following screen is displayed only during automatic registration of a 3D scan:

If the registration of the relevant system parts causes an error, communication with the navigation station is ended and the scan preparation interrupted.

If the system does not confirm registration within about 2 minutes, an error message is displayed on the monitor and the scan preparation is cancelled.

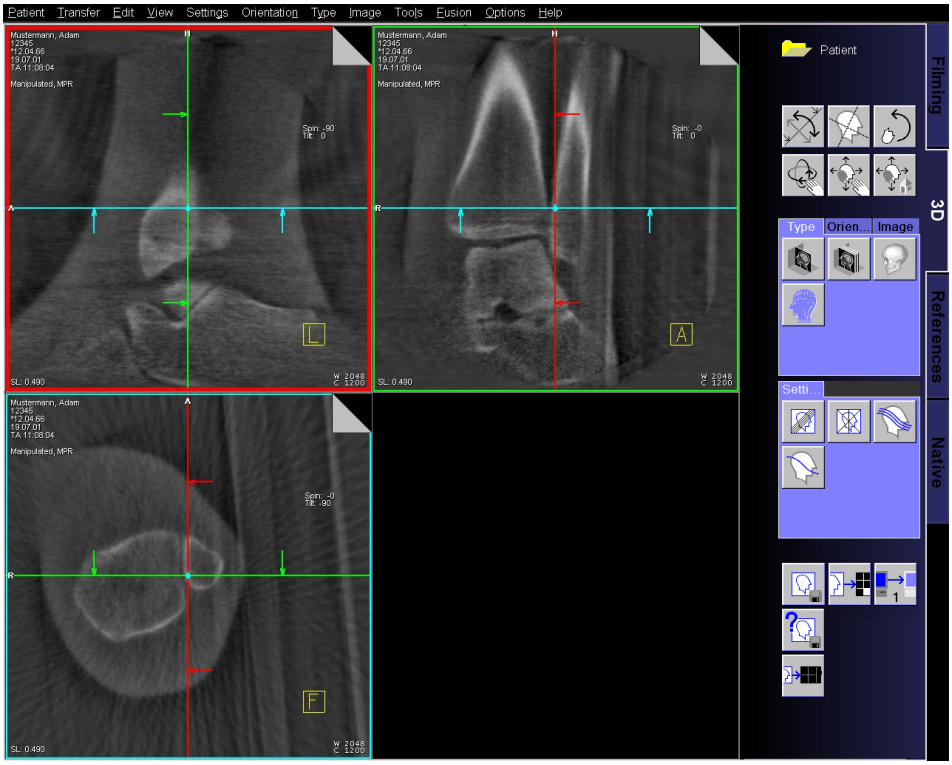
Scan

While the 3D scan is performed, a progress bar is displayed:



End of the scan

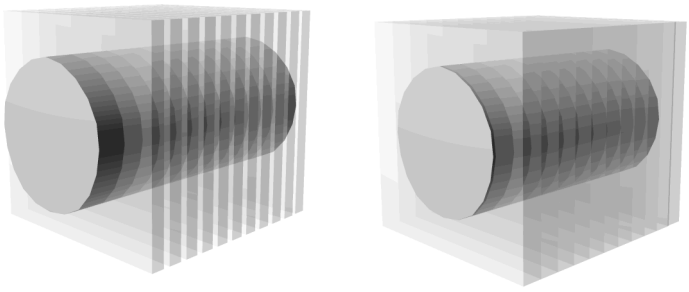
As soon as the scan is completed and all images have been saved, they are automatically loaded into the **3D** task card. There, the scanned volume is reconstructed and displayed as an MPR image.



3D evaluation

Introduction

Tomographic examinations provide consecutive cross-sectional slice images through an examined volume of the patient's body.
By combining these two-dimensional images, a three-dimensional view of the examined region is obtained.



(1) (2)

(1) 2D slice images

(2) Volume data set

In this three-dimensional display, you can work just like in a three-dimensional model. For example, you can generate new images, cut out individual regions and use a range of evaluation functions for special diagnostic problems.

Your system provides you with a number of alternative procedures for working with three-dimensional images.
You decide what method you want to begin with as soon as you load images into the **3D** task card.

On the 3D task card, you then prepare your image material using the selected method, or you start another image processing procedure.

3D evaluation method

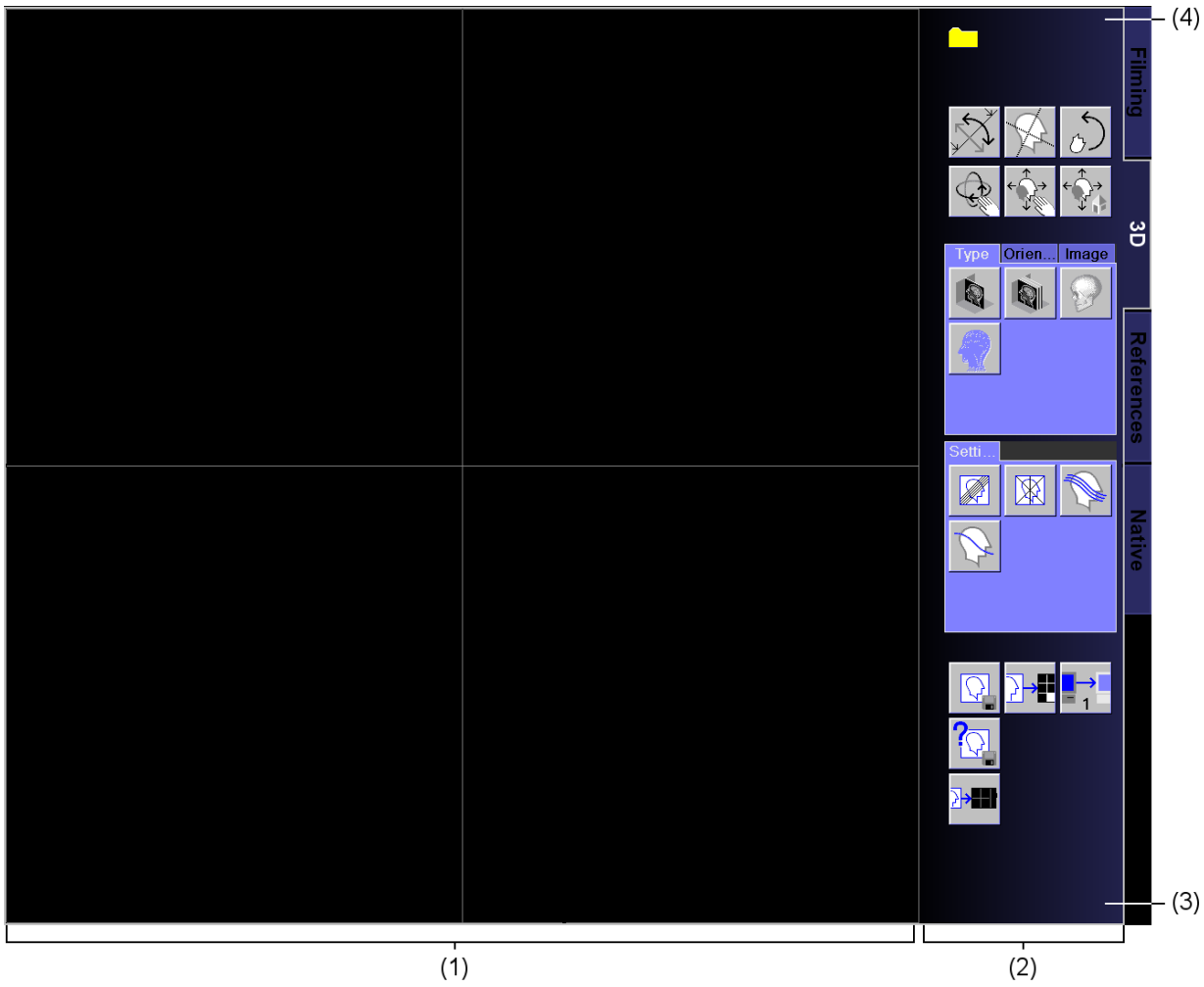
Your system provides you with the following methods for combining two-dimensional images to form three-dimensional views:

- ❏ Multiplanar reconstruction (MPR) is used to place slices in other orientations through the region of interest. The resulting images are two-dimensional.
- ❏ The surface shaded display (SSD) method is used, for example, to evaluate bone studies that you want to display with virtual three-dimensionality.

The 3D task card

You process your three-dimensional images on the **3D** task card.

The task card is subdivided into the following areas:



3D task card (no patient loaded)

(1) Image area, subdivided into four segments, optionally 1 segment

(2) Control area for easy access to functions

(3) Status block for ongoing actions and error display

(4) Menu bar

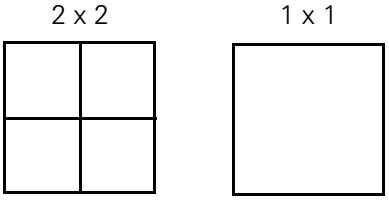
Image area

The images that you have loaded into the **3D** task card are displayed in the image area. Depending on the division of the screen and the number of images loaded, you can only see some of the images. The remaining images are in the background.

Layout of the image area

The image area is subdivided into segments. Each segment contains one image.

Depending on whether you want to see an overview of the loaded images, or whether you require a display suitable for reporting, you can choose between 2 layouts:

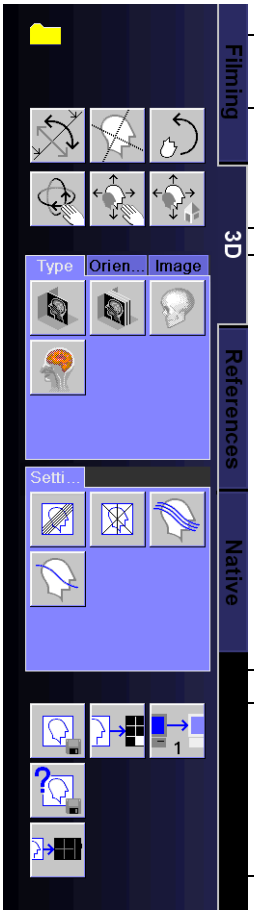


Control area

In the control area, you will find all the tools you need to select image material, arrange the screen display and process images.

Here you can also control data exchange with other parts of the program and access other applications.

You can access these functions easily using buttons and thus work much faster than via the menu bar.



Patient information

Image control

Subtask cards

Output control

Patient information:

The top of the control area displays the name of the patient whose images are currently loaded in the **3D** task card.

Image control: The buttons in the **Image control** area have the following functions:

Enabling/disabling **Free Mode** for rotating/setting the image planes
(→ Page 47)

Showing/hiding the cross hairs

Showing/hiding orientation control
(→ Page 54)

Activating/deactivating rotation mode
(→ Page 48)

Activating/deactivating zoom/pan mode
(→ Page 96)

Undoing all zoom/pan changes to the view
(→ Page 96)

Type subtask card: The buttons on the **Type** subtask card have the following functions:

Activating the MPR display mode
(→ Page 79)

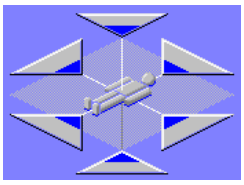
Activating the MPR Thick display mode
(→ Page 79)

Activating the SSD display mode
(→ Page 88)

Selecting the **Fusion** function
(→ Page 101)

Orientation subtask card:

The buttons on the **Orientation** subtask card have the following functions:



Setting the standard viewing direction
(→ Page 55)

Setting the standard orientation
(→ Page 57 and Page 58)

Aligning image planes perpendicular to the reference image
(→ Page 59)

Image subtask card:

The buttons on the **Image** subtask card have the following functions:

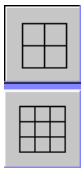
Measuring distances

Activating/deactivating Pixel Lens

Inserting annotations into images

Selecting **Fusion Registration**
(→ Page 106)

Activating Side-by-Side mode for Fusion
(→ Page 125)



Subdividing the image area (Fusion)

Settings subtask card: The buttons on the **Settings** subtask card have the following functions:

Generating series of parallel slice images
(→ Page 65)

Generating series of radial slice images
(→ Page 71)

Generating series of curved sections

Generating a curved section
(→ Page 84)

Output control: The buttons in the **Output control** area have the following functions:

Storing the image of the active segment
(→ Page 97)

Defining storage settings and storing the image of the active segment
(→ Page 97)

Copying images to the film sheet
(→ Register Filming/Printing and Archiving, Page 11)

Sending images to standard network nodes
(→ Register Filming/Printing and Archiving, Page 75)

Transferring the image of the active segment to the **Viewing** task card
(→ Page 100)

Transferring images to 3D

For three-dimensional image processing, you use examination images that are stored in the local database of your system or in the archive.

If your system is integrated into a hospital network, you can receive image data from other departments and wards and evaluate them on the 3D task card on your system.

In the **Patient Browser** window (**Patient > Browser**) you have access to these data. There you can search for patients, studies, series, or individual images and transfer them to the **3D** task card.

You can also transfer images from the **Viewing** task card to the **3D** task card.

Starting 3D evaluation

You call up 3D processing and load a 3D model in three steps:

Selecting images/ series for processing

First select the images or series that you want to display in three dimensions in the **Patient Browser** or on the **Viewing** task card.

In this step, you can select more than one series of one patient for 3D processing.

Selecting a 3D display method

Next, select a 3D method in **Applications > 3D** and transfer the selected images/ series to the **3D** task card.

Or

Drag & drop from the Patient Browser

Transfer the images selected in the **Patient Browser** as an MPR by *dragging & dropping* them onto the **3D** task card.

When transferring them, the system checks whether the images and series that you selected are suitable for 3D postprocessing. If necessary, the system displays a message box pointing out inconsistencies within the series.

Selected images that are to be displayed in three dimensions must at least fulfill the following criteria:

- ❏ All images must originate from one patient and from one study.
- ❏ At least 3 images must have been loaded into the 3D task card.
- ❏ All images must be parallel and be located on one axis.

If you have selected only one series which also fulfills all the above criteria, the images will be transferred to the **3D** task card and you can start processing them immediately.

If you select several series or an unsuitable series, the **3D Series List** is displayed.

Displaying a serie from the 3D Series List in three dimensions

The last step is to select a series from the **3D Series List** and transfer it to the **3D** task card.

On the **3D** task card, the selected series is displayed in three dimensions using the selected technique. You can now evaluate the display.

You can only ever process one series at a time on the **3D** *task card.*

Calling up the 3D task card

Once you have loaded images into the **3D** task card, you may switch to other applications and then return to the **3D** task card to continue processing the images.

- ◆ Click the card tab to return to the **3D** task card.
  - – The **3D** task card is placed in the foreground Its status has remained the same since you left the card.

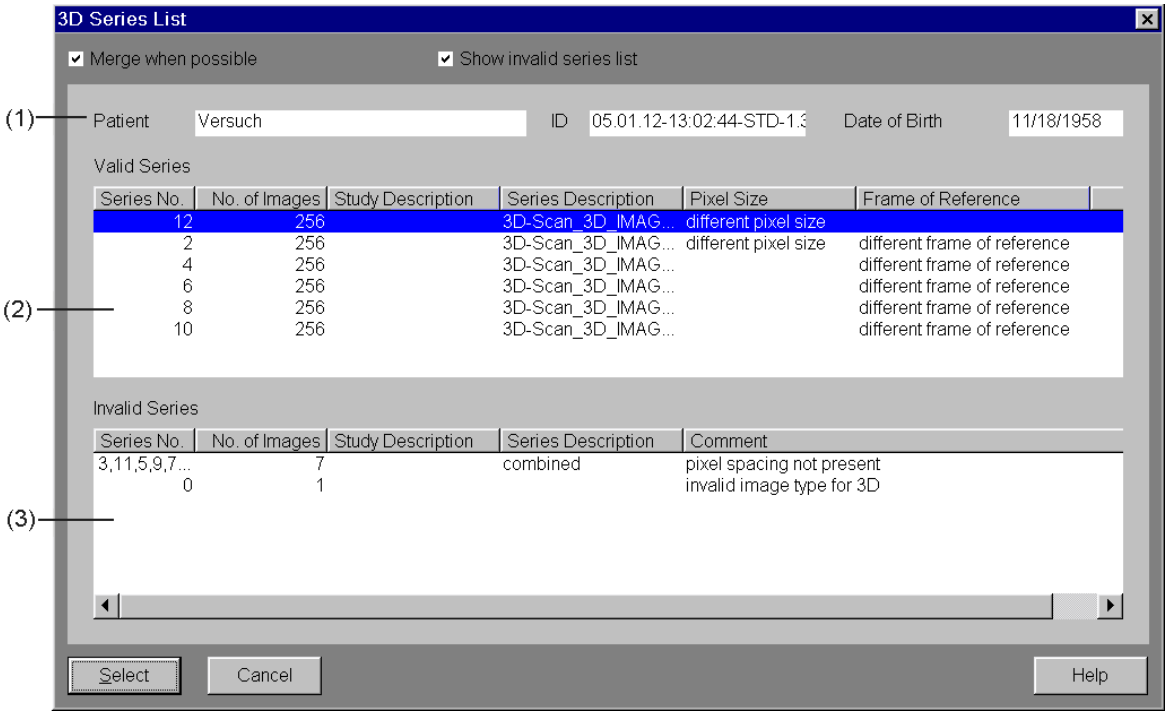
3D Series list

If the series you selected is not suitable for 3D display or if you have selected more than one series for processing, you can see the results of the selection check in the **3D Series List** dialog box.

Opening the 3D Series List

You can also open the **3D Series List** explicitly, for example, to load another series into the **3D** task card.

◆ Select **Patient > Open Series List...** in the main menu of the **3D** task card.
– The **3D Series List** dialog is displayed. It is divided into the following fields:



(1) Patient data

(2) Series suitable for 3D display (valid series)

(3) Series unsuitable for 3D display (invalid series)

Valid series All the series suitable for 3D reconstruction are shown in the top list (Valid Series). Depending on how many series you have selected, several lists may be displayed. You can, however, select and transfer only one of these at a time.

Invalid series All the series unsuitable for 3D reconstruction are displayed in the bottom list (**Invalid Series**). Displayed next to the series data you will also see a comment which gives a more detailed reason for rejection.

Your computer system has limited storage capacity. Thus, the number of images for 3D display is also limited. In the 3D Series List window, the images which cannot be loaded are shown in the **Invalid Series** *list.*

Hiding invalid series You can hide the Invalid Series list to obtain a better overview of the **3D Series List** dialog box.

- Click on the **Show invalid series list** check box to remove the checkmark and deselect the option.
  - The screen display is updated immediately, the Valid Series list is displayed larger. The **Invalid Series** list is no longer displayed.

If none of the series you selected is suitable for 3D display, i.e. the Valid Series list is empty, you cannot hide the **Invalid Series** *list.*

Transferring series to 3D

If the list of Valid Series contains more than one series suitable for 3D display, you have to decide which series you want to display and evaluate in three dimensions first.

You can only ever display and process one series at a time on the **3D** *task card.*

Only medical images can be transferred to the **3D** *task card. Processing of non-image data like spectroscopic raw data will be possible in a later software version.*

- In the list of Valid Series, double-click the series that you want to process first.

Or

- Select the required series in the list and click the **Select** button.
  – The series is transferred to the **3D** task card and the **3D Series List** dialog box is closed.

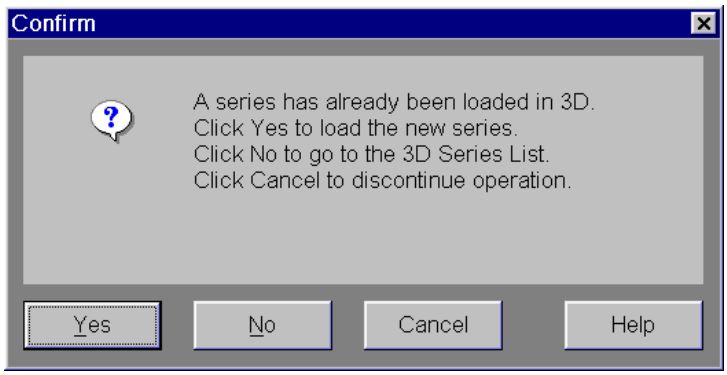
Closing without image transfer

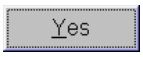
Once you have transferred images into the **3D Series List**, you can interrupt processing, for example, to edit images.

- Click **Cancel** to close the **3D Series List** dialog box.
  – You return to the **Viewing** task card or the **Patient Browser**.

3D task card busy

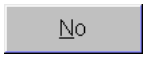
If you are processing another series on the **3D** task card, the **Confirm** dialog box is displayed.





- Confirm with **Yes** to load the new series onto the **3D** task card and close the old series.

Or



- Click **No**, if you want to continue processing the old series on the **3D** task card.
  – The new series is not transferred. The **3D Series List** dialog is displayed. There you can select a different series, for example.

Or

- To cancel the transfer of the new series, click Cancel.
  – You return to the **Patient Browser** or to the **Viewing** task card.

Other series from the 3D series list

You can also access any other series that you had marked for processing in the **3D Series List** from the **3D** task card.

- Call up the **3D Series List** dialog box by selecting **Patient > Open Series List ...**.
- Select another series and transfer it by clicking the **Select** button.
  – The previously loaded series is closed.

Working in 3D

Your data are present as a volume data set. A large variety of options are available to you for generating and processing two-dimensional images.

Various orientation aids, e.g., the orientation cube, guide you through the volume. They relate to a patient coordinate system that shows the viewing direction or the image orientation.

You can navigate through the volume to find the images relevant to your diagnosis. To do this, use the 3D cross hairs, the dog ears, or rotate the image data set using the mouse.

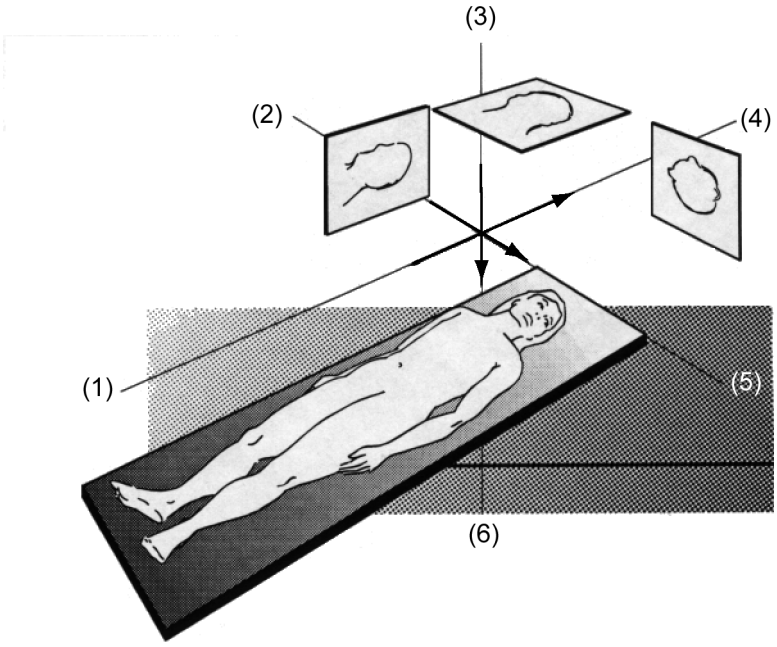
Once you have generated a reference image, you can reconstruct entire series in the desired view with the set output types.

You first generate an image in the orientation that you need. This is referred to as the reference image, since all subsequent steps relate to this image (either the orientation or the viewing direction). Then you select the output type, i.e. either MPR or SSD, or use the type already set.

The patient coordinate system

The image orientation is indicated by a patient-related coordinate system. In each image, these data tell you the direction from which you are looking at the patient (3D) and how a slice (2D) is positioned in the region of interest.

Directions Directions are indicated as follows in the patient coordinate system:



(1) F for feet

(2) R for right

(3) A for anterior

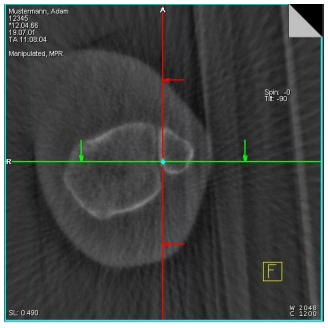
(4) H for head

(5) L for left

(6) P for posterior

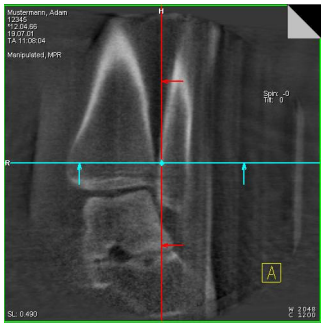
Anatomical standard views

Viewing directions along an axis of the patient coordinate system are called anatomical standard views. The slices which you look at in such views are designated as follows:



(1)

(2)



(3)

(1) Transversal slice

(2) Sagittal slice

(3) Coronal slice

Orientation aids in the image

Various aids are displayed for orientation in the image. They indicate from what direction you are looking at the image.

Orientation description

A tilt angle is displayed in the image as an orientation description relating to the standard view.

The orientation description is also filmed and stored.

Orientation cube

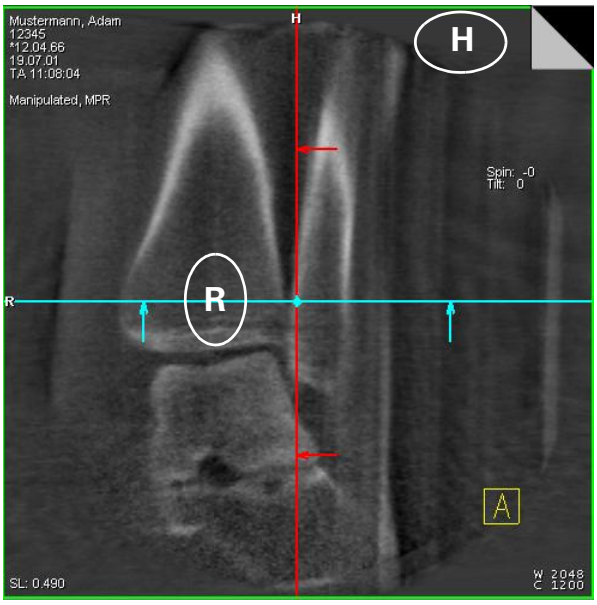
The orientation cube is displayed on all images. It indicates the position of the slice displayed with reference to the patient coordinate system.
(→ Page 40)

The cube is also filmed and saved together with the images.

Orientation labels

The orientation labels show you the orientation of the patient in the image. They correspond to the directions in the patient coordinate system and are not annotations that you can edit. This text is always displayed in the center at the top and left edge of the image.

- **L**, **R** - Left, Right
  Sagittal viewing direction
- **A**, **P** - Anterior, Posterior
  Coronal viewing direction
- **H**, **F** - Head, Feet
  Transversal viewing direction



Orientation in 2D images may be difficult in spite of orientation labels.

Image display in 3D

The image area on the **3D** task card is divided into four segments.

The first three segments are reference segments, the fourth segment is an output segment.

Reference segments

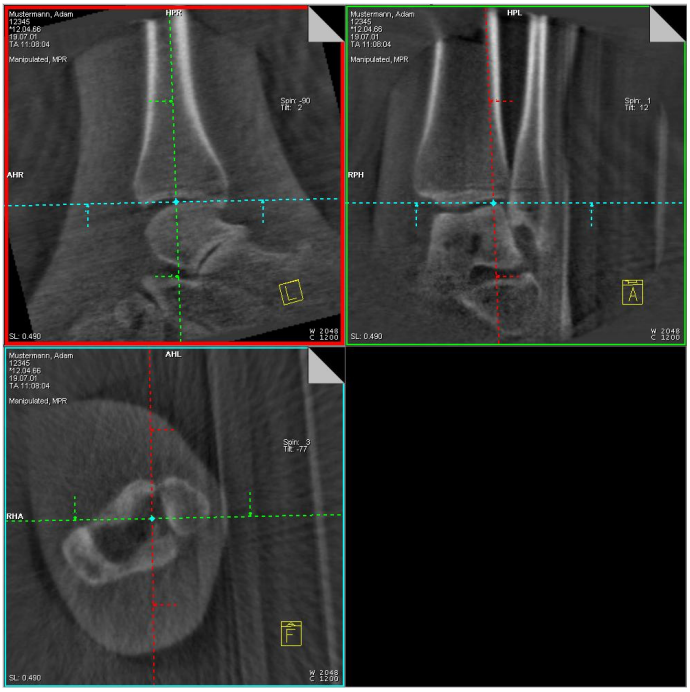
In the three reference segments the images are first shown in the views parallel and perpendicular to the direction of scanning.

By turning and moving the views you can define the position and orientation of the plane that is to be used as the reference image for the reconstruction of images or series.

The reference segments are used to *display* different views of the volume data set, while the reference image (the view) is used as a *reference* for 3D reconstruction.

Output segment

The images and series generated by various tools on the basis of the reference image are displayed in the output segment.

(1)  (2)

(3) (4)

(1) Reference segment (sagittal view)

(2) Reference segment (coronal view)

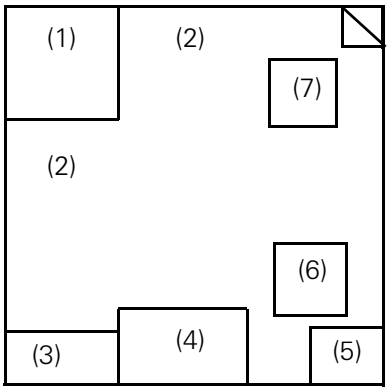
(3) Reference segment (transversal view)

(4) Output segment

Image information

Information about the patient, the examination and image data are shown on the images.

This information always appears in the same place as shown in the figure below:



(1) Patient data

(2) Orientation labels
(→ Page 41)

(3) Slice thickness (only MPR, MPR Thick)

(4) Image comment
(→ Page 98)

(5) Window values

(6) Orientation cube
(→ Page 41)

(7) Orientation description
(→ Page 41)

Of the standard text elements, the following elements are not displayed:

- ❏ Exposure-specific settings (e.g. gantry tilt)
  (normally in the bottom left corner)
- ❏ Hospital/System information
  (normally in the top right corner)
- ❏ Scale (on the right edge)

It depends on the configured settings whether or not the orientation description is displayed.
(→ Page 136)

Setting views in the volume data set

Three-dimensional image processing allows you to create images in any orientations and positions within the data volume. You "move" through the volume and can rotate it in any direction. Depending on the method you are using, various aids are available to you.

Using the 3D cross hairs

The continuous lines of the cross hairs (reference lines) indicate the position of two slice planes that are perpendicular to each other in the standard view (the lines represent the cut lines). The two planes are displayed in the other two reference segments.

The arrows indicate the viewing direction from which you view a plane (shown in the other image segments).

Broken lines indicate planes that are **not perpendicular** to the view displayed.

Moving reference lines

You can now move through the views of the reference segments in any direction using the lines.

- Click on a line and move it holding the left mouse button down.

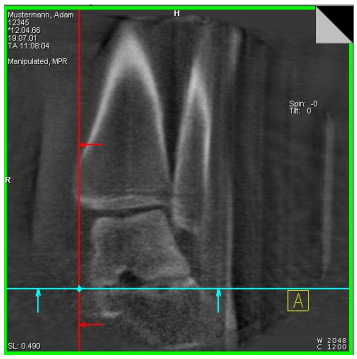
Or

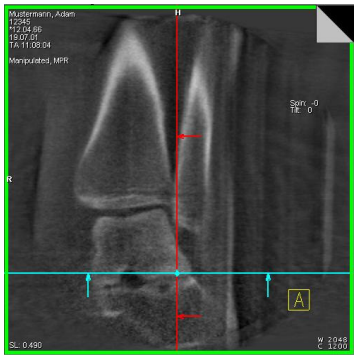
- Click on the intersection of the lines to move both lines at the same time.

As an alternative, you can move the reference lines to a target position in jumps by mouse click.

- Click a line to select it and then click the target position with the left mouse button.

The reference line is moved there immediately.

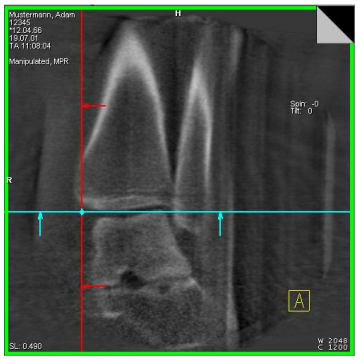


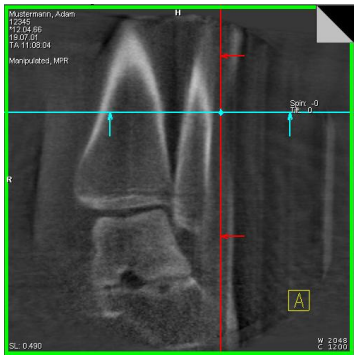


Or

- Select the entire reference image and click the target position with the left mouse button (no reference line selected).

Both lines are moved in such a way that the intersection is now at the position you clicked.





Rotating using the cross hairs

You can change the view in a reference segment by rotating the corresponding line of the cross hairs in one of the other two segments.

To rotate the reference lines, you must activate **Free Mode**.

- Click the **Free Mode** button.
  – The angles between the reference lines are no longer fixed.

- Rotate the required line about the displayed center of rotation.

In this way, you create oblique planes (only one line is oblique) or double-oblique planes (both lines are oblique).

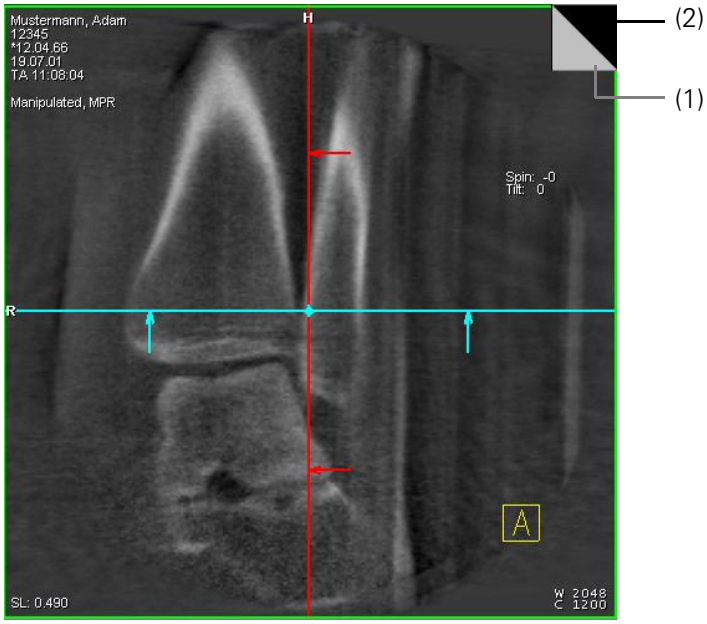
Deactivate **Free Mode** to fix the angles again:

- Click the **Free Mode** button.

Scrolling with the dog ears

When you have set the MPR output type, you will see dog ears in the top right-hand corner of the reference segments.

Using the dog ears, you can move through the volume forward or backward slice by slice. The corresponding line of the cross hairs in another segment moves in parallel.



(1) Scroll backwards

(2) Scroll forwards

Rotating the volume with the mouse

You can also create oblique and double-oblique images by rotating the image display in one of the segments with the mouse.

- Click the button in the upper part of the control area.
- When you position the mouse cursor on the segment, the cursor changes shape.

- Move the mouse cursor keeping the left mouse button pressed down.
- ❏ Moving the mouse up or down tilts the object.
- ❏ Moving the mouse left or right rotates the object.
- ❏ A diagonal mouse movement results in a combined rotation and tilt movement.

If the **Zoom/Pan mode** *is activated, you have to deactivate it first.*

Rotating about one axis (oblique cut planes)

For oblique slices, you rotate a slice about **one** axis of the patient coordinate system starting from the standard view.

The orientation is displayed in the image as a combination of two orientation labels. This designation is comparable with the designations used on a compass, e.g. NW for north-west.

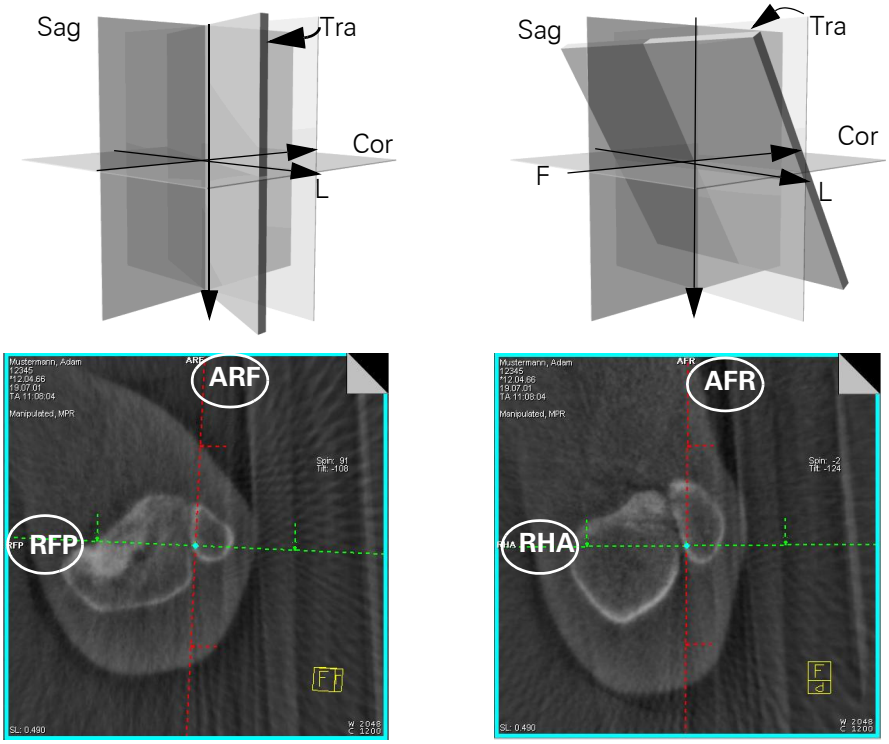
One of the two reference lines in the image is now dotted. The corresponding plane is therefore oblique in relation to the displayed image.

For each standard view, there are two different directions of rotation (about an axis), each of which are explained graphically in the following examples.

Transversal slice

You can rotate a transversal slice toward the coronal or sagittal plane:

- ❏ Rotation of the transversal slice toward the sagittal slice (left example)
- ❏ Rotation of the transversal slice toward the coronal slice (right example)

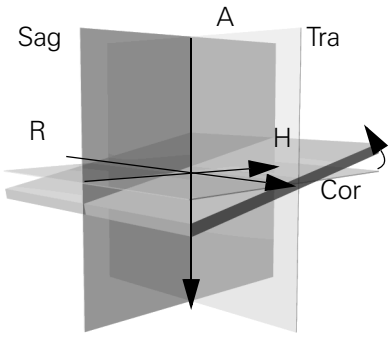


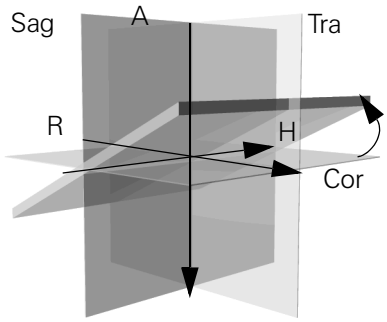
Depending on the direction of rotation, further combinations of orientation labels are displayed, e.g. RFP, ARF, RHA or AFR.

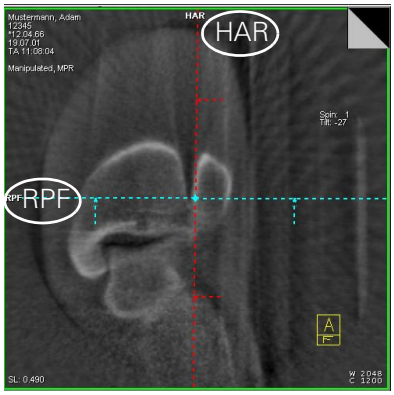
Coronal slice

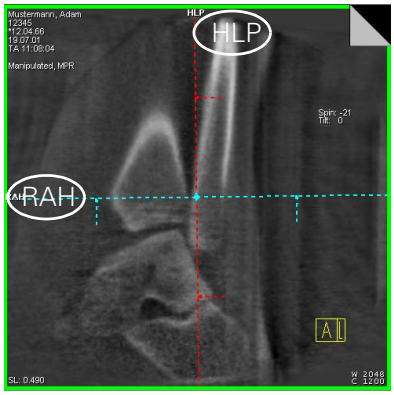
You can rotate a coronal slice toward the transversal or sagittal plane:

- ❏ Rotation of the coronal slice toward the transversal slice (left example)
- ❏ Rotation of the coronal slice toward the sagittal slice (right example)







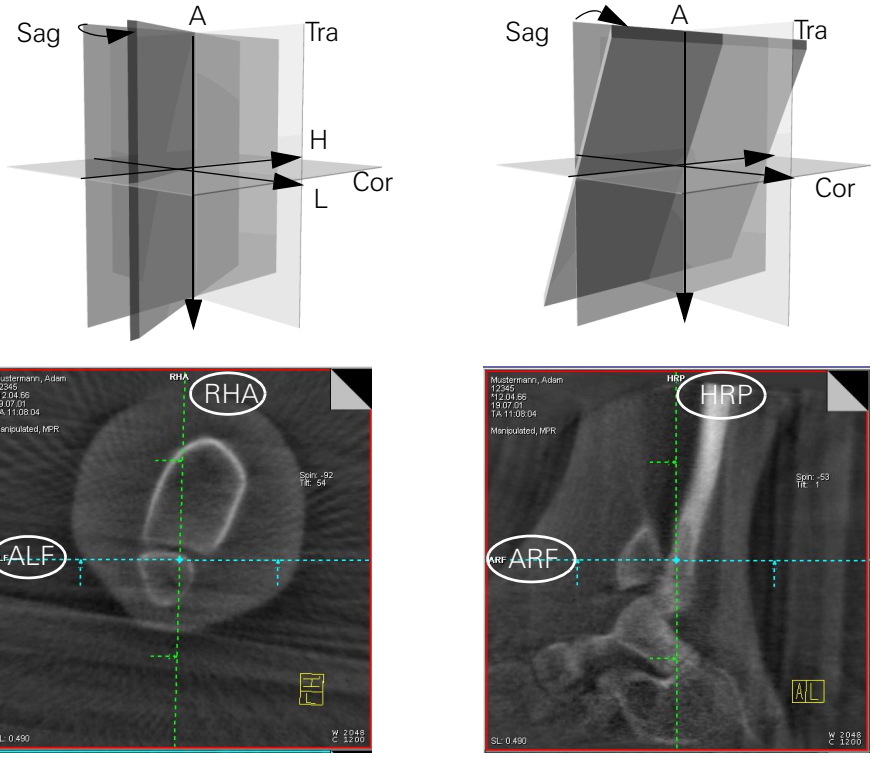


Depending on the direction of rotation, other combinations of orientation labels such as RPF, HAR, RAH or HLP can result.

Sagittal slice

You can rotate a sagittal slice toward the transversal or coronal plane:

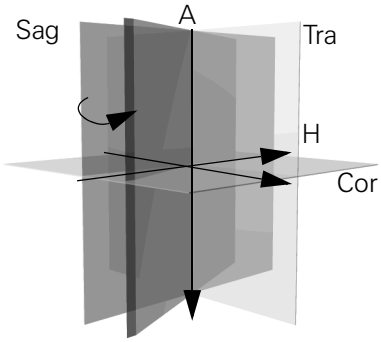
- ❏ Rotation of the sagittal slice toward the transversal slice (left example)
- ❏ Rotation of the sagittal slice toward the coronal slice (right example)



Depending on the direction of rotation, other combinations of orientation labels such as ALF, RHA, ARF or HRP can also result.

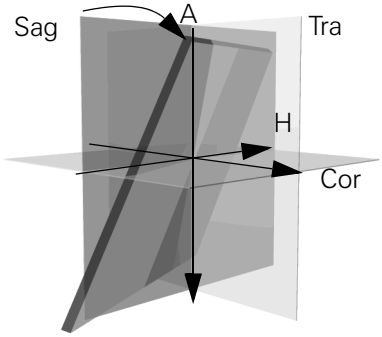
Rotating about two axes (double-oblique cut planes)

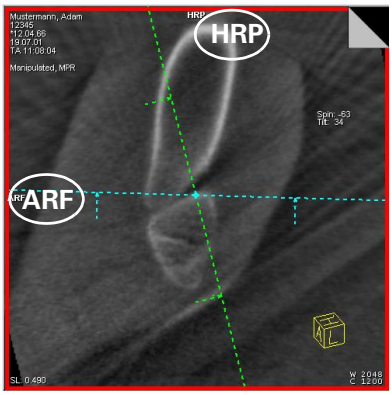
Double-oblique cut planes are obtained by successively rotating one slice about *two* different patient coordinate axes. The plane is then no longer perpendicular to either of the coordinate axes. The image orientation is displayed as a combination of three orientation labels.



(1)

(2)





(3)

(1) Rotation of the sagittal slice toward the transversal slice (left example)

(2) Rotation of the sagittal/transversal slice toward coronal (right example)

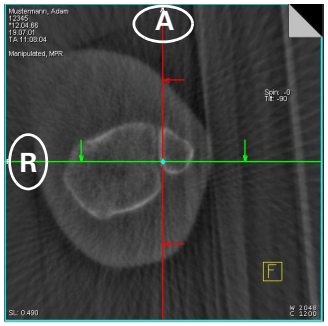
(3) Resulting view

Controlling image orientation

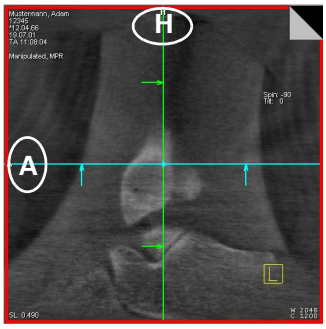
If you rotate the image in a reference segment, the viewing angle changes. To make orientation easier for you in such images, orientation labels are displayed in the images.
(→ Page 41)

Preferred directions

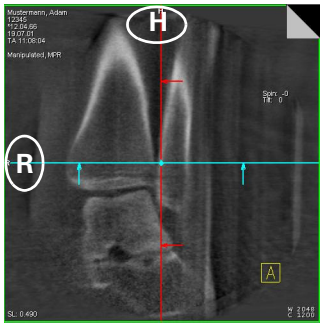
The program also uses the following **preferred directions** for image orientation/ rotation within the selected cut plane:



(1)



(2)



(3)

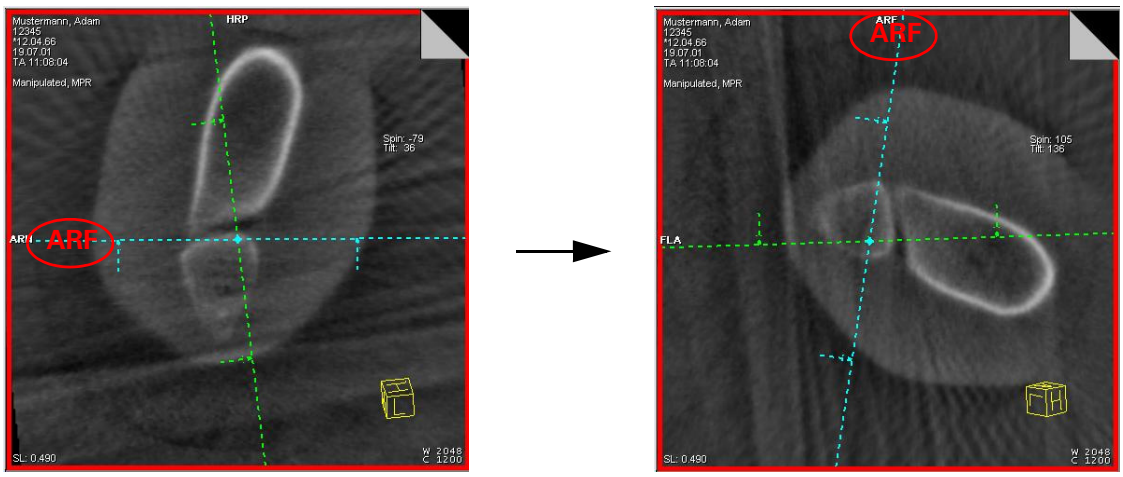
(1) In a predominantly **transversal** view, the front side is at the top (orientation label A at the top). The viewing direction is towards the head (orientation cube shows F, since "feet" are at the front).

(2) In a predominantly **sagittal** view, the front of the patient is on the left (orientation label A is on the left) and the head at the top (orientation label H is at the top).

(3) In a predominantly **coronal** view, the head of the patient is at the top (orientation label H at the top) and the right side of the patient is shown on the left side in the image (orientation label R on the left).

Automatic orientation control

If you rotate and tip an image from the sagittal plane towards the transversal plane, for example, you will eventually find yourself in the transversal view. The program then rotates the image by another 90° to display it in a preferred direction again.



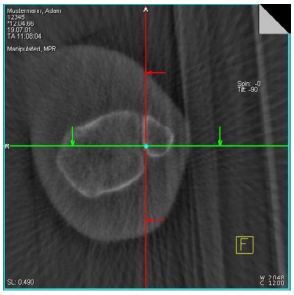
- Click the **Orientation Control** button in the upper part of the control area.

Setting standard views

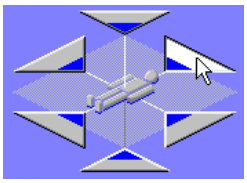
The standard views are used as a starting point for processing images on the **3D** task card.

You can set views for individual segments independently. For example, you can select a different view for each segment or define the same view in all segments.

Transversal view



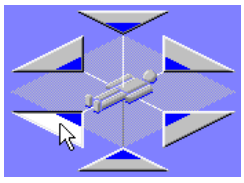
In the transversal view, you view the slice images of the patient perpendicular to the patient axis (axis that runs from the head to the feet of the patient).
Your viewing direction is therefore from top to bottom or from bottom to top, i.e. cranio-caudal or caudo-cranial.



- Select **Orientation > Head to Feet** or click the button on the **Orientation** subtask card.

The viewing direction changes to *transversal, cranio > caudal*, that is, from the head to the feet.

Or

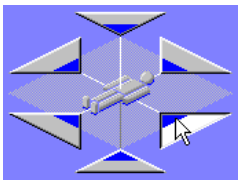


- Select **Orientation > Feet to Head** or click the button on the **Orientation** subtask card.

The viewing direction changes to *transversal, caudo > cranial*, that is, from the feet to the head.

Sagittal view

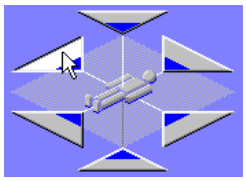
In the sagittal view, you view the patient from the side (from the left or from the right).



- Select **Orientation > Left to Right** or click the button on the **Orientation** sub-task card.

The viewing direction changes to *sagittal, left > right*. You are viewing the patient from the left side.

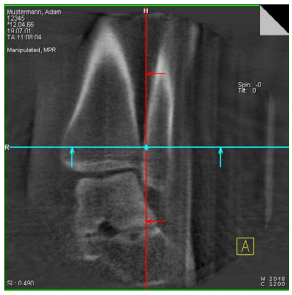
Or



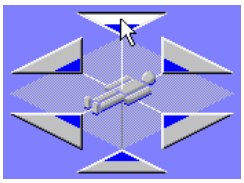
- Select **Orientation > Right to Left** or click the button on the **Orientation** sub-task card.

The viewing direction changes to *sagittal, right > left*. You are now viewing the patient from the right side.

Coronal view



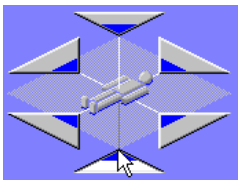
In the coronal view, you view the patient from the front or the rear.



- Select **Orientation > Front to Back** or click the button on the **Orientation** subtask card.

The viewing angle changes to *coronal, anterior > posterior*. You are now viewing the patient from the front.

Or



- Select **Orientation > Back to Front** or click the button on the **Orientation** subtask card.

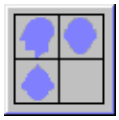
The viewing angle changes to *coronal, posterior > anterior*. You are viewing the patient from the rear.

Restoring the standard orientation

The standard views serve as orientation aids. You can return to the standard view from any other view and start processing again.

- Select **Orientation > Reset** to restore the view set at the beginning of processing (only possible in reference mode).

Or



- Click the **Default Orientation** button on the **Orientation** subtask card.

Fixing the angle

As soon as you have set the views to a particular viewing angle, you can fix the angles. After that, it is no longer possible to rotate the reference lines. They can only be moved.

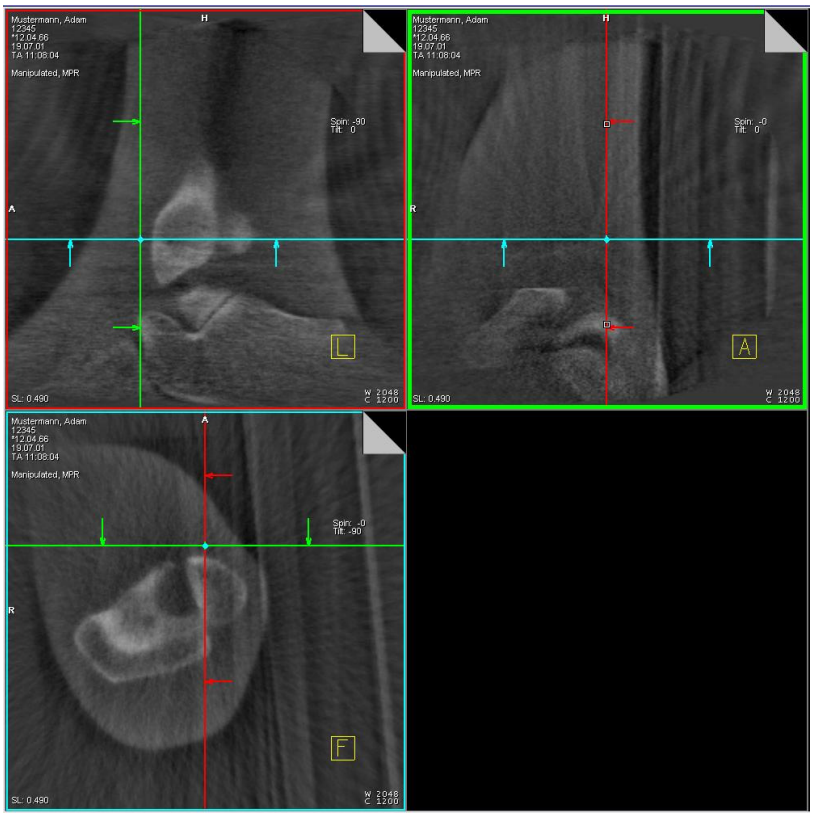
- Click this button in the upper control area to deactivate **Free Mode**.
  – The angles are fixed.

Setting orthogonal views

If you want all the images in the three reference segments to be at right angles to each other, deselect **Free Mode**.

- Click the **Default Orientation** button.
  – All views are now perpendicular to each other in the standard view.

- Deactivate **Free Mode** to fix the right angles.
  – Now the angles between the reference lines remain constant. The reference lines now show the standard view.



View perpendicular to the reference image (Ortho Sync)

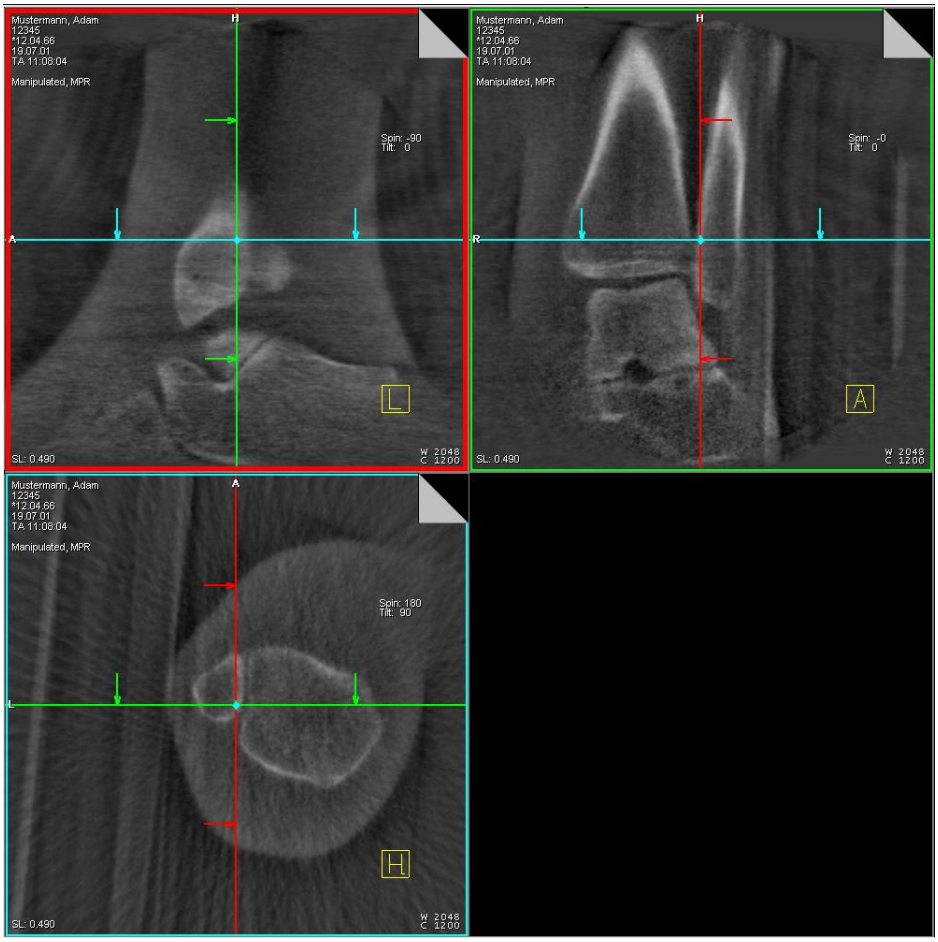
Usually, you activate the orthogonal view to display slices along the main axis, e.g. of a bone. In order to do this, you first set the viewing direction in the reference image.

- Select **Orientation > Ortho Sync**.

Or

- Click this button on the **Orientation** subtask card (only possible in reference mode).
  - Now the other reference segments show views that are perpendicular to the reference image, in the example below the top left-hand image.

These images do not necessarily have to be perpendicular to the patient coordinate system.



Defining output types

You can change the output type for any segment at any time, i.e. from multiplanar reconstruction (MPR) to surface shaded display (SSD).

Depending on your working method, you will first generate a reference image, e.g. in MPR, in the desired view and then switch to SSD display.

◆ Click on the segment for which you want to change the output type.

If you want to switch over all segments, you must select these individually and then switch them over one after the other.

Setting MPR

Using multiplanar reconstruction, you can generate slice images in a view and position that you define in the volume data set.

◆ Select **Type > MPR**.

Or

◆ Click the **MPR** button on the **Type** subtask card.

Or

Transfer the images directly from the **Patient Browser** or the **Viewing** task card to MPR mode.

◆ To do this, select **Applications > 3D > MPR**.

Or

◆ Click the **MPR** button in the respective application.

Setting SSD

After you have generated a reference image, you can also generate a surface structure in this view.

- Select **Type > SSD**.

Or

- Click the **SSD** button on the **Type** subtask card.

A surface view is generated in the selected segment. Your system uses modality-specific default grayscale values as threshold values to extract the surface.

Or

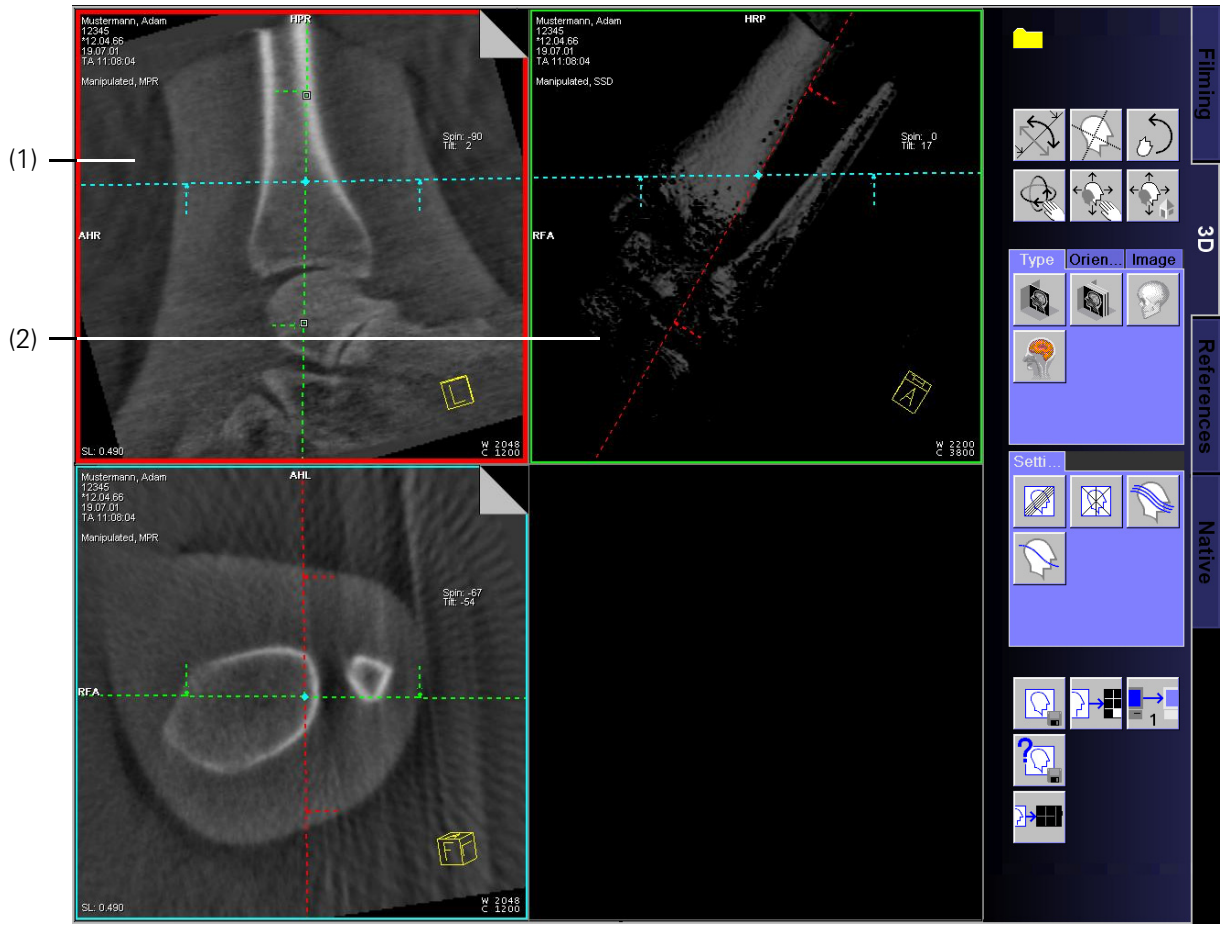
Transfer the images directly from the **Patient Browser** or the **Viewing** task card to SSD mode.

- To do this, select **Applications > 3D > SSD**.

You can display complete volume data sets in the SSD display.

3D task card with mixed output types

In each of the three reference segments you can set any output type independently.



(1) MPR image

(2) SSD image

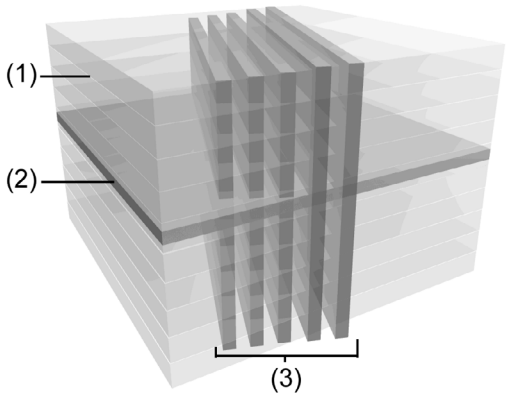
Generating series from 3D images

In most cases, the result of your 3D evaluation will be the reconstruction of entire series (ranges) of images. To do that, first select a reference image in the view that you require.

Depending on the output type you are using, the following options will be available to you:

Parallel ranges

You generate series (ranges) of slice images that are parallel to one another and perpendicular to the reference image for the MPR and MPR Thick output types.



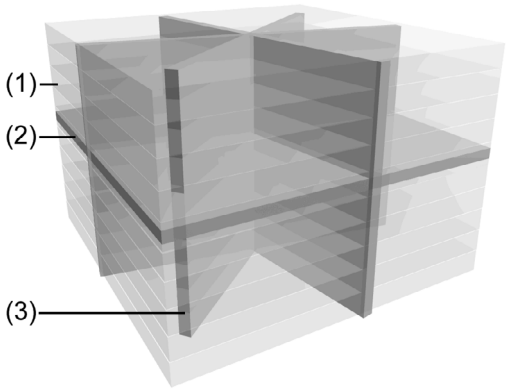
(1) Volume data set

(2) Reference image

(3) Parallel slice images

Radial ranges

For the MPR output type you generate a series of slice images that are arranged radially. For the SSD output type you generate a series of projections and views of the volume that are each rotated about a defined angle.



(1) Volume data set

(2) Reference image

(3) Radial slice images

Generating parallel slice images

To generate a parallel range, you generate images that are parallel and a defined distance apart, and perpendicular to the reference image. This is equivalent to a step-by-step offset of a reference line of the 3D cross hairs.

- Select a continuous reference line to define the position of the reconstructed images with that line.

The reference line you select represents an image in one of the other two reference segments. This image must be of the required output type, i.e. MPR.
(→ Page 45)

Or

- Select a broken reference line or a reference image to generate a series whose slice planes are horizontal in the center of the reference image and perpendicular to the reference image.
- Select **Settings > Parallel Ranges**.

Or

- Click the **Parallel Ranges** button on the **Settings** subtask card.

In the selected reference segment, the positions of the parallel slice images to be reconstructed are shown graphically. The slice image of the selected reference line (preview) is displayed in the output segment.

Graphical display of the new range

The lines in the output segment show the position of the individual images. The arrows indicate the viewing direction.

(4) **(4)** **(3)** **(2)** **(1)**

(1) End line

(2) Reference line

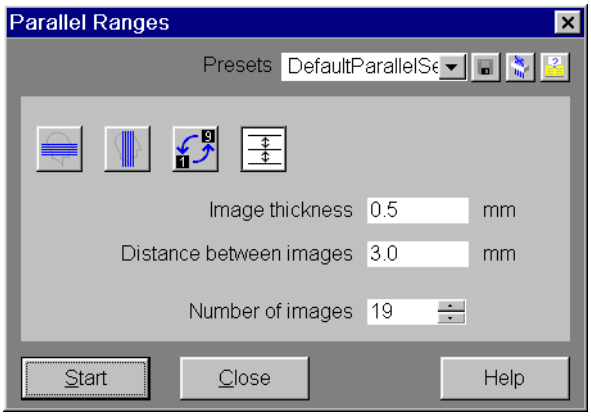
(3) Start line (marked by arrows)

(4) Arrows indicate the viewing direction

If the series consists of many images, not all the lines are displayed in the graphic. Here, the interior lines are displayed darker.

Parallel Ranges dialog box

The **Parallel Ranges** dialog box opens.



Changing a range numerically

- Enter the slice thickness of the result images and press the Enter key. Also refer to (→ Page 82).

- Enter the distance between the individual images and press the Enter key.

- Enter the number of parallel slice images and press the Enter key.

Generate at least three images.

- If you want to generate a series (range) with horizontal clip planes, click this button.

Or

- If you want to generate a series (range) with vertical clip planes, click this button.

- To reverse the image numbering of the series, click this button.

The graphical display of the series in the reference segment changes according to your settings. A new preview image is reconstructed in the output segment.

Changing the range with the mouse

You can also increase or reduce the range of a series reconstruction by moving the start line or end line with the mouse. The image that corresponds to the line you have just processed is displayed in the output segment.

- Click on the start or end line and move the line while holding the left mouse button down.
  - The distance between the slice images changes accordingly (is increased or decreased). The number of images remains the *same*. The values in the **Parallel Ranges** dialog box change in accordance with the changes in the graphical display.

Or

- Click this button to move the start line or end line with the mouse.
  - The distance of the slice images to each other changes correspondingly. The number of images remains the same.
  - The values in the **Parallel Ranges** dialog box change automatically to reflect the changes made to the graphical display.

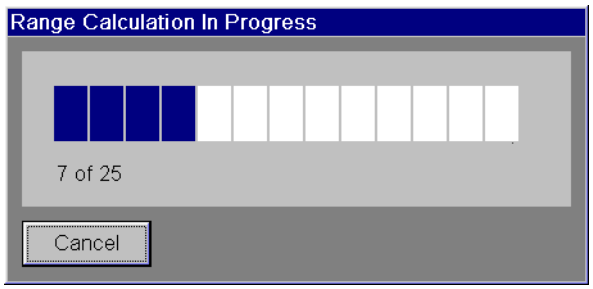
- Move the entire range by moving the rotation point of the reference line with the mouse.

- Rotate the entire range by moving the reference line around the rotation point with the mouse.

Starting reconstruction

Once you have made all the required settings, start with the reconstruction:

- Click **Start**.
  - A progress bar shows how many of the planned images have been generated. Every newly reconstructed image is shown in the output segment.



Canceling reconstruction

You can cancel reconstruction at any time.

- Click **Cancel** in the progress box.
  – All the images that have been reconstructed are displayed in the output segment.

If the **auto store** *function is active, all the images that have already been reconstructed are saved, even if the process is canceled.*
(→ Page 137)

Ending reconstruction

After reconstruction has been completed, the last image of the range (the image of the end line) is displayed in the output segment.

Each image of the series (range) is automatically assigned a number.

- To view the images of the series, scroll through the image stack using the dog ears.

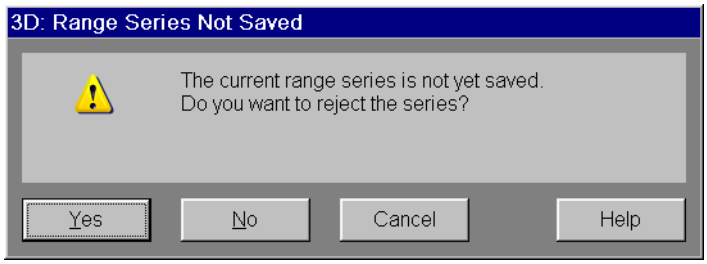
If you are satisfied with the new series:

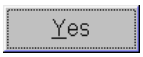
- Save the series.
  (→ Page 96)

If the **auto store** *function is active, the series is automatically saved.*
(→ Page 137)

- Click **Close** to return to the reference mode.

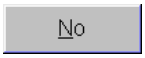
If you have not stored the reconstructed series, the following dialog box is displayed:





◆ If you want to reject the series, click **Yes**.
– The **Parallel Ranges** dialog box is closed.

Or



◆ If you want to process or save the series, click **No**.

Postprocessing parallel ranges

If you are not satisfied with the reconstructed range, you can adapt it either graphically or in the **Parallel Ranges** dialog box.

If you generate a new series by changing the values, a query appears asking whether you want to save or reject the old series.

Generating radial slice images

Radial slice images are generated so that a range can be viewed from different angles. In this way, you simulate step-by-step rotation of a reference line. Depending on the angle, a number of slice images are generated from the volume data set.

- Select a broken reference line or a reference image to generate a series whose slice planes cover a quadrant in the reference image and are perpendicular to the reference image.
  (→ Page 43)

The selected reference line represents an image in one of the other two reference segments. This image must be of the required output type, i.e. MPR.
To find out how to generate series of radial projections (SSD), please see:
(→ Page 76)

Or

- Select a continuous reference line to define the position of the reconstructed images with the reference line.
- Select **Settings > Radial Ranges**.

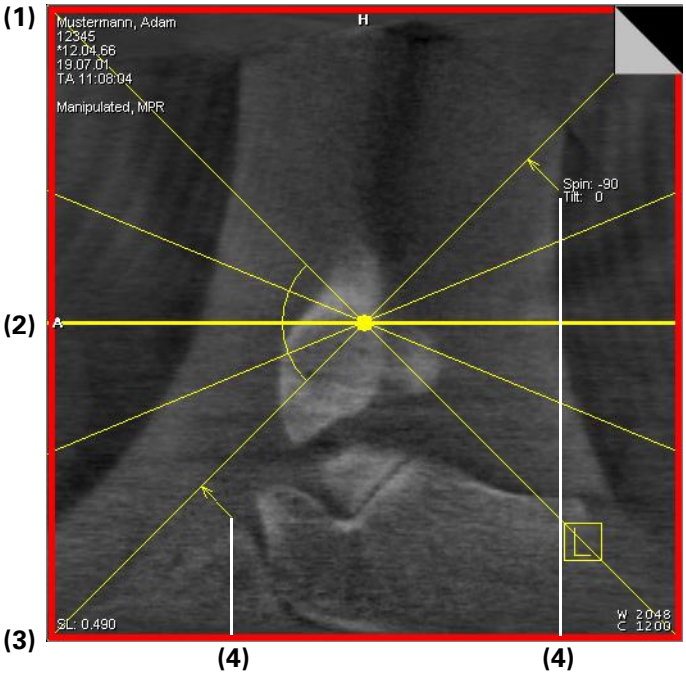
Or

- Click the **Radial Ranges** button on the **Settings** subtask card.

Graphical display of the radial range

The radial slices are displayed as lines in the reference segment. The lines have a common point of intersection and are arranged with a constant angle between them (default 22.5°).

The image of the reference line is reconstructed and displayed in the output segment. The direction of viewing of the resulting images is indicated by the arrows in the reference segment.



(1) End line

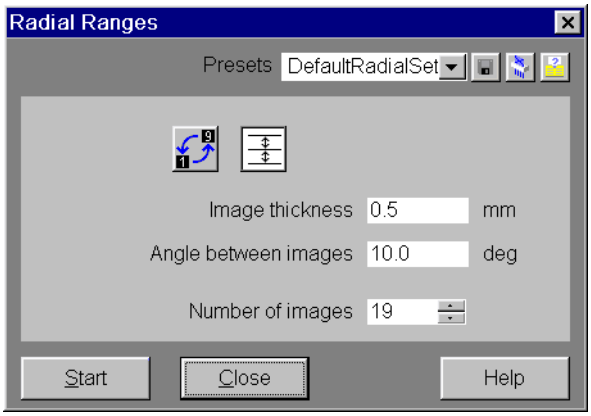
(2) Reference line

(3) Start line (marked by arrows)

(4) Viewing direction arrow

Radial Ranges dialog box

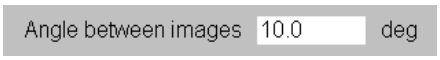
The **Radial Ranges** dialog box is displayed.



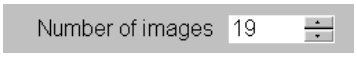
The settings you first see are the default settings. You can change them according to your requirements.

Changing a range numerically

- Enter the original slice thickness and press the Enter key.



- Enter the required angle between the images and press the Enter key.
  - The position of the start line and end line remains unchanged. If you enter a new angle between the images, the number of images is changed accordingly.



- Using the spin buttons, set a new number of images to be reconstructed and press the Enter key.
  - The angle between the images changes accordingly.

Changing the range with the mouse

- Place the mouse cursor on the start line, the center line, or the end line.

- Rotate the selected line around the rotation point while keeping the mouse button pressed.
  - By rotating the center line you also rotate all the other lines around the rotation point. Rotating the start line and end line changes the angle of aperture.

If you rotate the start line over the end line, angle measurement restarts at 0° again.

Or

- Move the entire range by moving the point of rotation with the mouse button pressed.

The image that corresponds to the line you have just processed is displayed in the output segment. The values in the **Radial Ranges** dialog box change to reflect the changes made to the graphic display.

If you change the range by rotating the start or end line, the number of images remains constant. Only the angle between the images changes.

Starting reconstruction

- Click **Start** to start reconstruction of the range.
  - A message box shows the progress of reconstruction and allows you to cancel reconstruction.
  - The reconstructed images are displayed as a stack of images in the output segment. The upper image corresponds to the end line in the graphical display.

- To view the images of the series, scroll through the image stack using the dog ears.

If you are satisfied with the new series:

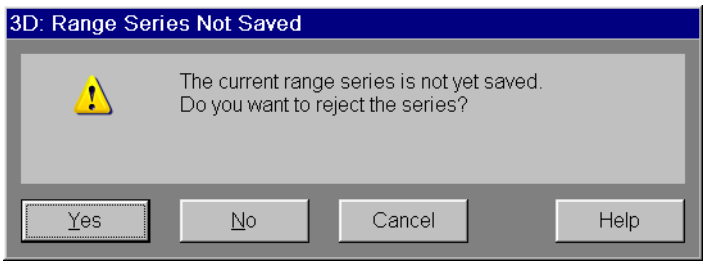
- Save the series.
  (→ Page 96)

If the **auto store** *function is active, the series is automatically saved.*
(→ Page 137)

Close

- Click **Close** to return to the reference mode.

If you have not stored the reconstructed series, the following dialog box is displayed:



Yes

- If you want to reject the series, click **Yes**.
  – The **Radial Ranges** dialog box is closed.

Or

No

- If you want to process or save the series, click **No**.

Postprocessing radial ranges

You can rotate the start and end line of a range in order to change the range and the angle between the result images.

If you generate a new series by changing the values, a query appears asking whether you want to save or reject the old series.

Series of radial projections and views

For the SSD output type you do not reconstruct slice images, but series of projections and view.

Defining viewing directions

The future position of the projections/views is displayed graphically by projection arrows on the reference image. The reconstructed images are at right angles to these arrows. The arrows therefore indicate the direction from which you view the projection. You can define the orientation of these arrows as follows:

- Select a broken reference line or a reference image.

The projections of the series describe a quadrant (first or second quadrant) within the reference image.

Or

- Select a continuous reference line in your reference image to define the direction of viewing graphically.

The reference line you select represents an image in one of the other two reference segments. This image must be of the required output type, i.e. SSD.

The selected reference line is at right angles to the center projection arrow of the series graphics. All other projections are obtained by rotating this reference line clockwise or counterclockwise.

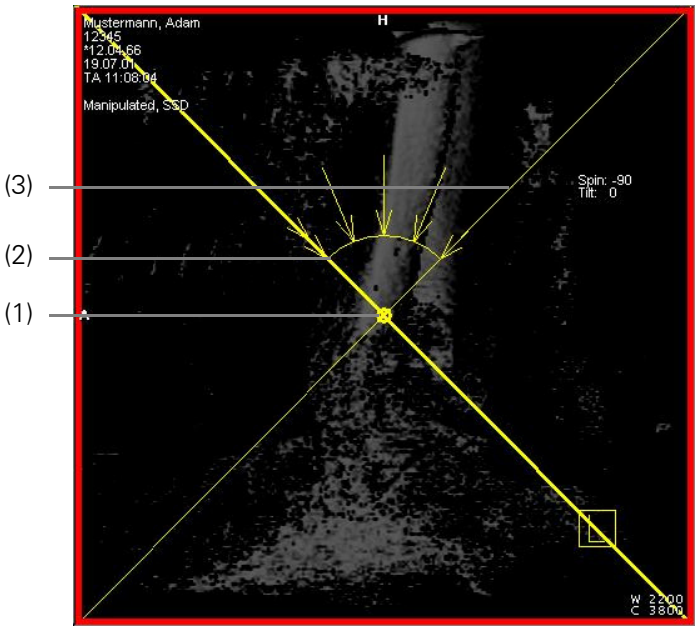
Setting radial projections and views

You can generate radial projections in radial range mode in the same way as radial slice images in the MPR output type. The images of this series simulate step-by-step rotation of a reference line.

- Select **Settings > Radial Ranges**.

Or

- Click the **Radial Ranges** button on the **Settings** subtask card.
  - The range of the new series is marked in the reference image. The arrows indicate the direction of the projections.

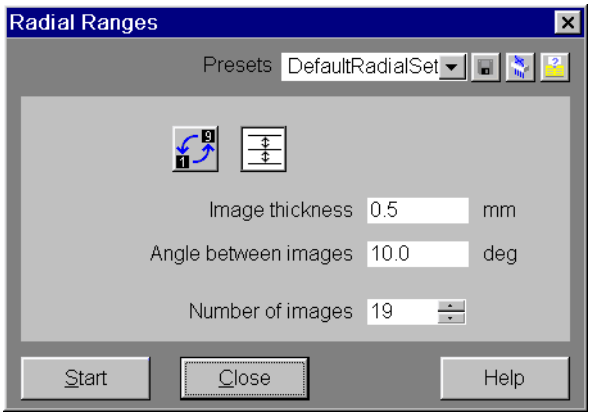


(1) Rotation point

(2) Start arrow (double arrow)

(3) End arrow

The **Radial Ranges** dialog box is displayed.

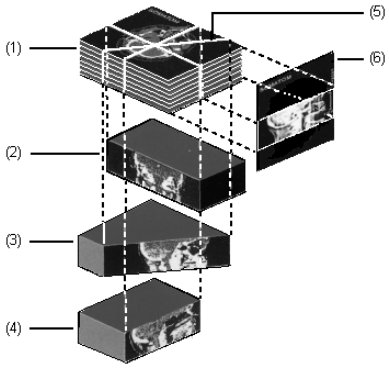


With the exception of the slice thickness, you now select all the other settings for the radial range either in the **Radial Ranges** dialog box or with the mouse in the reference image analogously to the reconstruction of radial slices.
(→ Page 71)

Multiplanar reconstruction (MPR)

Multi**p**lanar **r**econstruction allows you to reconstruct secondary images of any planes from the volume, for example sagittal, coronal, or any curved views.

You can reconstruct both single images and series of images.



(1) Transversal/axial

(2) Coronal

(3) Paraxial

(4) Sagittal

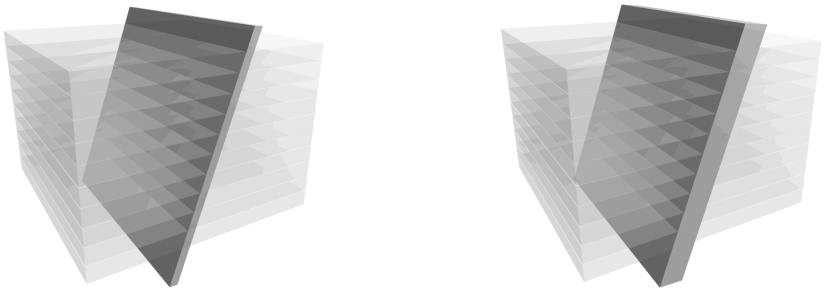
(5) Paraxial

(6) Sagittal

In MPR, two-dimensional images are reconstructed from the "volume". However, you can move through the representation quickly using the 3D cross hairs or the mouse to gain a three-dimensional impression.

The smaller the distance between the slices or the larger the degree of overlap of the original images, the greater the resolution in the examination direction.

The minimum slice thickness of an MPR image is one voxel. But you can generate thicker slices (MPR Thick). The mean grayscale values are calculated for voxels located one behind the other.



(1) (2)

(1) MPR slice (1 voxel slice thickness)

(2) MPR Thick (slice thickness can be set)

In multiplanar reconstruction you can create parallel or radial ranges, or curved cuts from a selected view.

The multiplanar reconstruction is first displayed in the views that are parallel and perpendicular to the direction of scanning.

You can then move through the volume using the functions of the **3D** task card such as the 3D cross hairs or the mouse in order to generate the views which are important for you.

Transferring to 3D as MPR

You have selected a series of images for display in **3D MPR** in the **Patient Browser** or the **Viewing** task card and then transferred them, if possible, (or from the **3D Series List** dialog box) to the **3D** task card.

The **3D** task card is placed in the foreground The series is loaded and shown in the MPR display mode.

If you had already loaded images into the **3D** *task card and have only temporarily switched to another application, switch back to* **3D** *by clicking the tab card.*
(→ Page 34)

Once you have finished processing your first 3D series and saved it, you can load the next marked series directly from the **3D Series List** *(***Patient > Open Series List***). If the last patient processed is in 3D, a dialog box appears in which you can specify whether you wish to continue processing or load the new series.*
(→ Page 38)

Changing the slice thickness (MPR Thick)

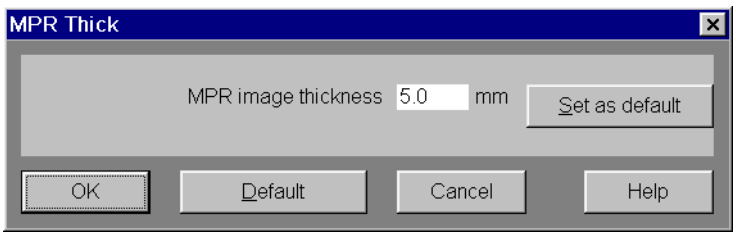
With MPR for thick slices, you can define the thickness of the original slice from which the image is to be reconstructed. The program calculates an average from several grayscale values and uses these averages to reconstruct the image.

- Select **Type > MPR Thick** to set the output type **MPR Thick**.

Or

- Click the **MPR Thick** button on the **Type** subtask card.
- Select **Type > MPR Thick**.

- Using the **right** mouse button, click the **MPR Thick** button on the **Type** subtask card.



- Enter an image thickness (in mm).

- Confirm your entry with **OK**.

Or

- Click **Default** to set the same thickness as for the original images.

The default setting is the slice thickness of the input data set.

- Click this button to store your entry as default setting.

The selected setting is applied to all the **following MPR Thick** reconstructions. The new slice thickness is not applied until you reconstruct a new series.

The value for **MPR image thickness** *is displayed in the image and always filmed and saved together with the image.*

Generating series of images

The possibility of generating images at any interval and in any direction allows you to simulate examinations independently of the scanning direction.

The images thus reconstructed can then be saved as new series and, for example, transferred to the **Viewing** task card for 2D evaluation.

Parallel slice images

In this mode, parallel slice images are generated at a defined distance. The images are perpendicular to the reference image.

- To generate and process parallel ranges, proceed as described in the following chapters:
  (→ Page 65 and Page 70)

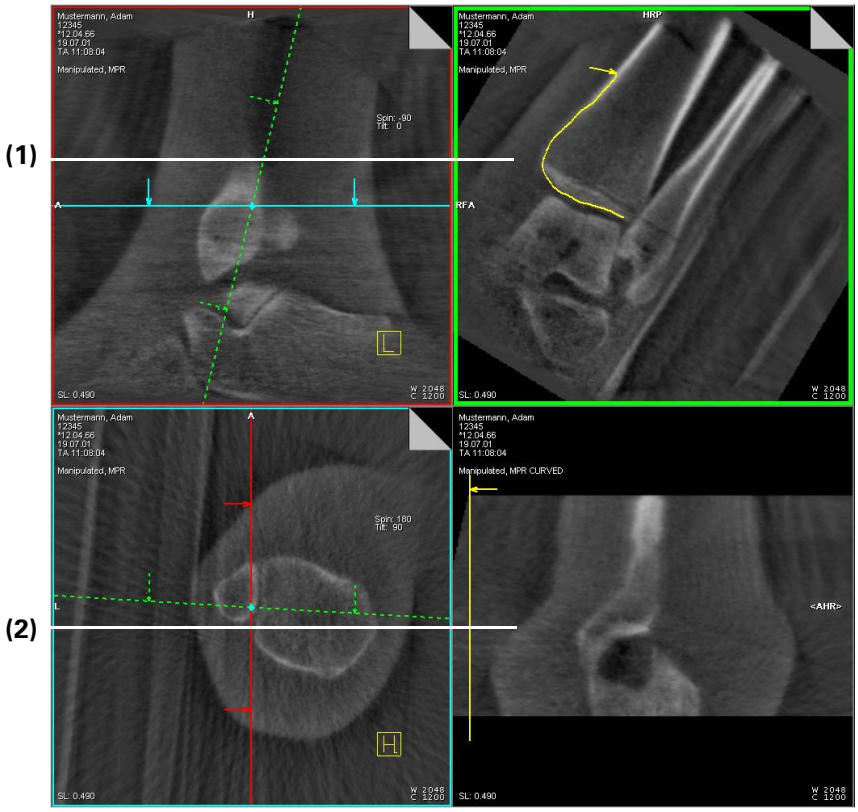
Radial slice images

The images are arranged radially and at a defined angle to one another. They are perpendicular to the reference image.

- To generate and process radial ranges, proceed as described in the following chapters:
  (→ Page 71 and Page 75)

Generating curved images

If you want to view subareas that cannot be acquired by planar, i.e. flat images, you can draw a freehand curved cut line. You can then display this cut as a slice image in the output segment.



(1) Working segment

(2) Output segment

Drawing curves

You have already generated a view which is important to you in reference mode.

You can set any output type, e.g. SSD, in the working segment.

- Select the segment that contains your reference image.
- Select **Settings > Curved Mode**.

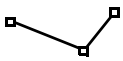
Or

- Activate curved mode by clicking the **Curved Mode** button on the **Settings** subtask card.

The program is in drawing mode and the cursor changes shape.

Polygon curve as cut line

You can draw a cut line by entering several vertices.



- Click into the working segment (selected segment) with the left mouse button to define the beginning of the cut line.
- Define further points along the cut line by clicking each position at which you want the direction to change with the left mouse button.
- Finish off the line by double-clicking with the left mouse button.

Drawing a freehand line

As an alternative, you can also draw structures freehand.

- Draw a curve by moving the mouse cursor across the image with the left mouse button pressed.
- Finish off the freehand line by double-clicking with the left mouse button.

For some applications, it may be necessary to connect a polygon curve with a freehand line and vice versa.

As long as you have not double-clicked the end point, you can mix the two methods, polygon curve and freehand line.

The way the image is reconstructed depends on the direction in which the line is drawn. For example, if you draw the spinal canal starting from the top and moving downwards, the image you produce is different to the one you produce when you draw the spinal canal from the bottom to the top (opposite way round).

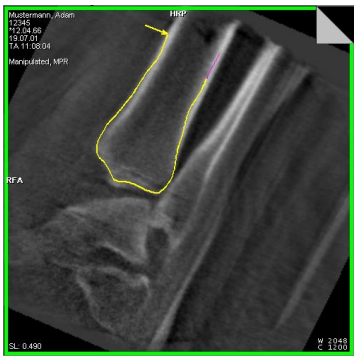
Displaying images

After you have completed your cut line, a new image is reconstructed in the output segment. In the reference image (working segment), the starting point of this image is marked by an arrow.

Long cut lines

If you have drawn a very long cut line, it might not be possible to display the entire image in the output segment. Instead, only the first section of the line is used to generate a slice image. This part is then highlighted in the working segment.

The starting point of the display is marked by an arrow.



Caution

No orientation aids in the image.

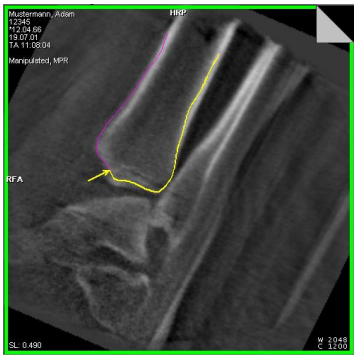
Incorrect interpretations.

- The physician conducting the examination is responsible for the professional and correct interpretation of the reconstructed image.

Moving the line section

- Move the starting point in the working segment to display further sections of the cut line by moving the arrow along the line with the mouse.

A new image is generated. In this way, you can gradually display the entire course of the structures.

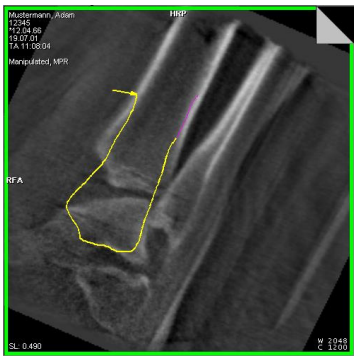


Moving the entire line

Occasionally you might want to move a curved cut line in the working segment to a new location.

- Place the mouse cursor on the line.
  – The mouse cursor changes shape.

- Move the entire line holding the left mouse button down.
  – A new image is displayed in the output segment.



Delete a line by pressing the **Del** *key.*

The direction in which you have drawn the curve into the working image is shown by an arrow on the resulting image.

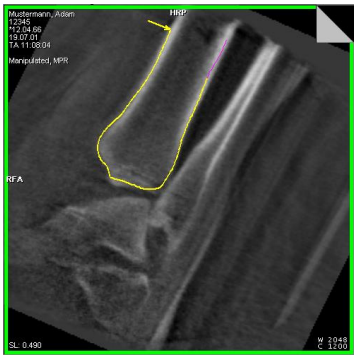
Moving a curve within the volume using the dog ear

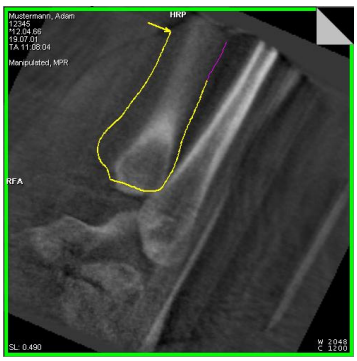
You can also move the cut line within the volume data set layer by layer by scrolling with the dog ear of the working segment.

- Click on the outside field of the dog ear to move forwards.

Or

- Click on the inner field of the dog ear to move backwards.



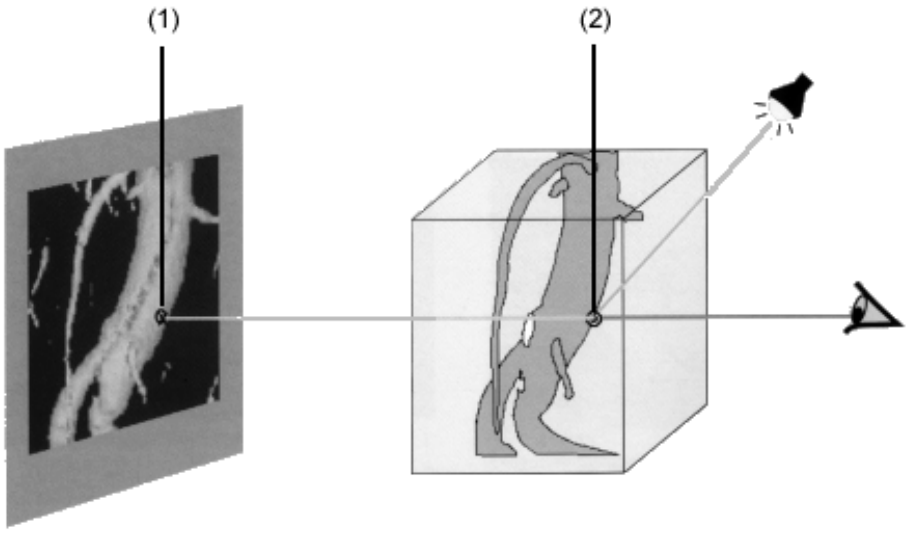


Surface shaded display (SSD)

◆ Select **Type > SSD** to switch to SSD mode.

This method allows you to reconstruct surfaces from the examined volumes. These volumes consist of voxels (volume pixels) whose grayscales are within a range defined by two limit values, an upper and a lower grayscale limit.

With Orbic 3D, SSD serves for orientation, but cannot be regarded as a 1:1 representation of the real bone.



(1) Voxels in the SSD image

(2) Foremost surface voxel in the volume data set

The foremost voxel of the volume range that is within a defined grayscale range is displayed in the SSD image.

You can change the viewing direction in real time with the mouse or 3D cross hairs. You can also generate series of views from different viewing angles.

You can, for example, cut out any structures to expose areas of special interest.

The grayscales that are shown in the display no longer correspond to the measured values. They are only intended to create a three-dimensional impression.

A fine distinction in the density of the tissue is no longer possible.

Your system stores commonly used modality-specific defaults as threshold values for surface extraction in SSD.

If these defaults are not appropriate for your diagnostic problem, you can adapt them individually. In this way, you can display the structures of interest to you in an optimum way.

Analogously to multiplanar reconstruction (MPR), you can generate new radial ranges on the basis of SSD views and save these images for further processing.

Transferring to 3D as SSD

You have selected a series of images for display in **3D SSD** in the **Patient Browser** or the **Viewing** task card and then transferred them, if possible, (or from the **3D Series List** dialog box) to the **3D** task card.

The **3D** task card is placed in the foreground The series is loaded and shown in the SSD display mode.

If you had already loaded images into the **3D** *task card and have only temporarily switched to another application, switch back to* **3D** *by clicking the tab card.*
(→ Page 34)

If you have finished processing your first 3D series and saved it, you can load the next marked series directly from the **3D Series List** *(***Patient > Open Series List***). If the last patient processed is in 3D, a dialog box appears in which you can specify whether you wish to continue processing or load the new series.*
(→ Page 38)

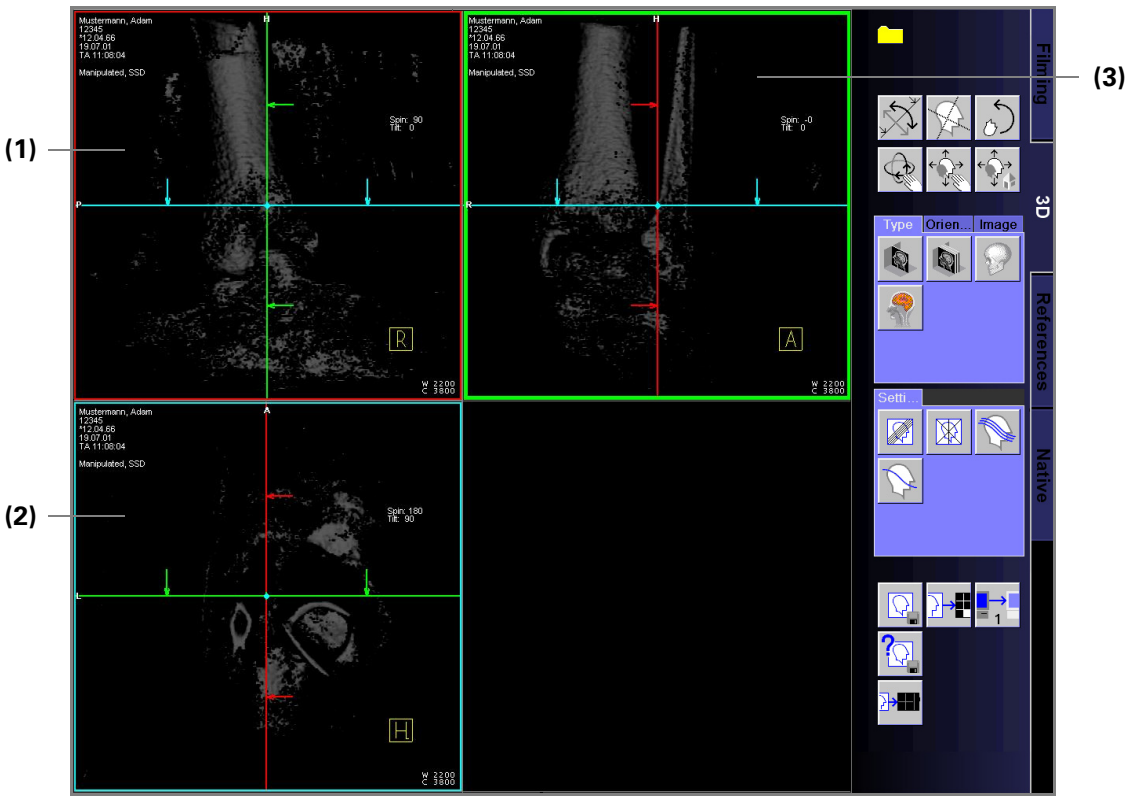
SSD images only have one window value.

A message box informs you of the progress of surface reconstruction. This progress display appears only the first time you call up SSD and whenever you have changed the threshold values. If you do not change the threshold values, the SSD images are reconstructed immediately.

As long as the message box is displayed you can cancel the operation with the **Cancel** button.

Once reconstruction has been completed, all segments contain an SSD view in the set viewing direction.

In each of the three reference segments, an SSD display is shown in the standard view.



(1) Sagittal view

(2) Transversal view

(3) Coronal view

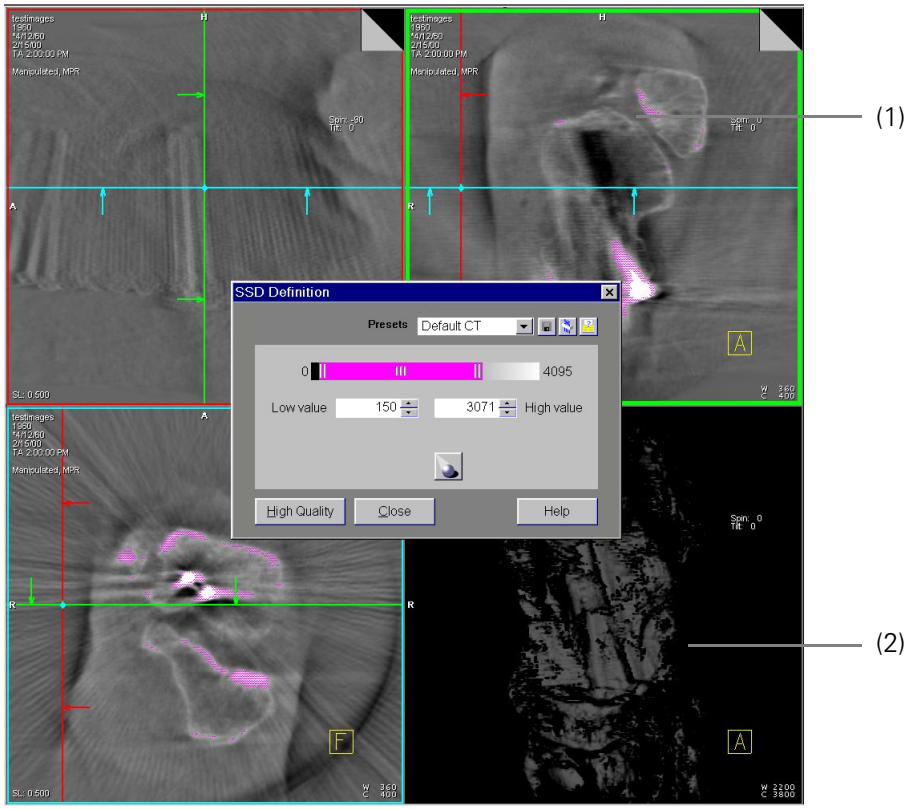
SSD reconstruction with changed thresholds

If the SSD reconstruction based on the default threshold values in the system is not appropriate for your diagnostic problem, you can adapt these values. You can then reconstruct your surface image again.

- Select **Type > SSD Definition...** to switch to threshold mode.

In all three reference segments, MPR images are displayed. In these images the ranges lying within the thresholds are highlighted.

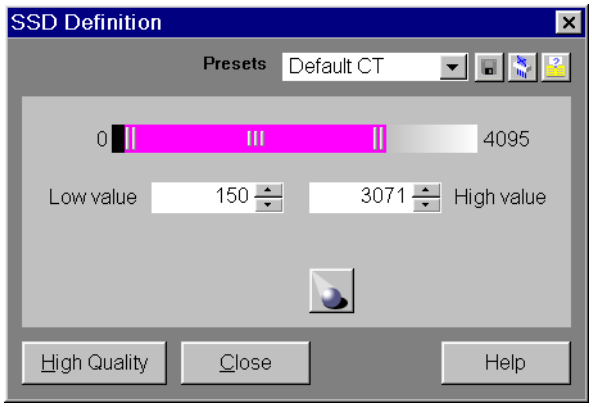
The output segment contains an SSD image which is based on the set threshold values.



(1) Highlighted pixels

(2) SSD image

The **SSD Definition** dialog box is displayed.



In the **SSD Definition** dialog box, the preset or last used threshold values are displayed for **SSD** extraction.

- Enter new threshold values in the input fields and confirm with the Enter key.

Or

- Set the required threshold values with the mouse by changing the width (left/right handle) and position (center handle) of the slider.

The threshold values entered are applied to the displays in the reference segments.

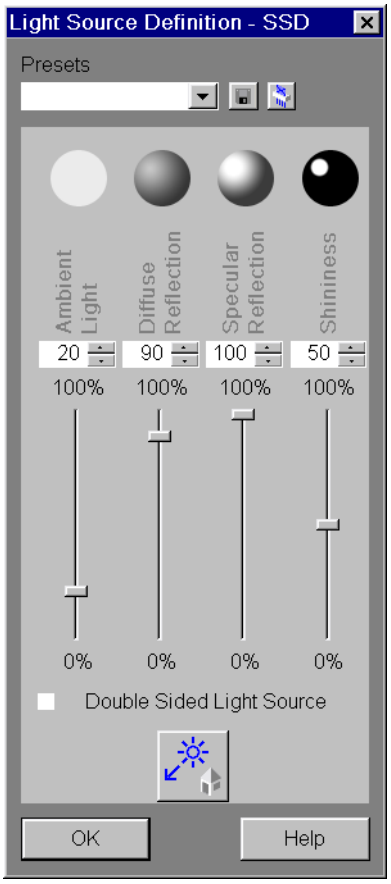
Light source

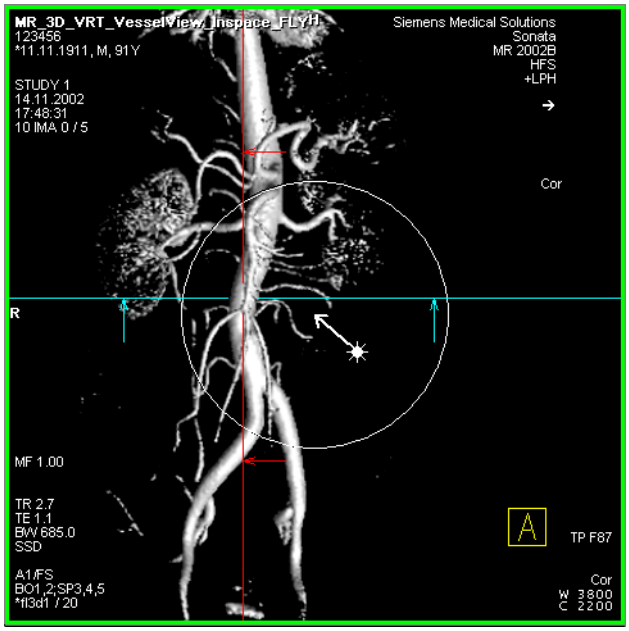
You can set a light source to obtain a better display of the surface condition of anatomical structures.

Click this button.

– The **Light Source Definition - SSD** dialog box is opened.

– An arrow is shown in the selected segment which indicates the direction of the light source.





- Move the arrow with the mouse to change the direction of the light source.
- Use the sliders to set the required ambient light, diffuse reflection, specular reflection, and shininess.

- Click this check box to set a double-sided light source.

The 2 light sources are identical in all parameters except that they shine from opposite directions.

◆ If you want to restore the original direction of the arrow, click this button.

The direction of the light source does not change when the image is rotated or shifted.

OK

◆ Click **OK** to apply the settings and close the **Light Source Definition SSD** dialog window.

Returning to reference mode

If you are satisfied with the new surface display, close the **SSD Definition** dialog box and return to reference mode.

Close

◆ Click **Close**.

In reference mode, all reference segments are shown as they were last saved before you started threshold mode.

Now select SSD as the output type for one of these reference segments. You can see a surface shaded image based on your new threshold values.

Generating a radial range of SSD images

Using radial projections, you can generate views of your surface structure from different angles.

Generating radial series

To find out how to generate radial ranges of SSD projections, please refer to the description in the following chapter:
(→ Page 76)

Parallel slice images and curved cuts

Based on the SSD display, you can also generate parallel images and curved cuts. However, the results are always displayed as MPR images. To find out how to generate parallel ranges and curved cuts, refer to the description in the following sections:
(→ Page 65 and Page 84)

Selecting and processing images

After you have transferred a volume data set to the **3D** task card, you can optimize the display of the images in the segments.

You can adapt the window values of the loaded images. You can display segments enlarged and regions of interest at the center of the screen.

Selecting images

You must first select the images or graphics that you want to process.

On the **3D** task card, a distinction is made between images displayed in the reference segments and ranges shown in the output segment.

Selecting the reference segment

In a reference segment, you can only ever select one reference image.

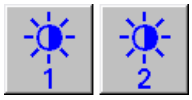
- Click the image that you want to process with the left mouse button.
  – The segment is now displayed with a thick border.

Windowing images

For details on windowing refer to (→ Register Viewing, Page 36).

Assigning stored values

In the **3D** task card, you can assign stored window values to the images:



- Click the **Window 1** or **Window 2** button on the **Image** subtask card of the control area.

Defining the scope of action

In the default setting, all images of the same output type, e.g. MPR, are assigned the same window values.

If you want to assign window values only to individual images, activate the **Single Windowing** option.

- Select/deselect **Image > Single Windowing** to activate/deactivate single windowing.

Zooming and panning images

- Click this button in the control area.
  – Zoom/pan mode is activated.

Zoom image

- Position the mouse pointer near the image edge.
- Drag the mouse up or down to zoom the image, holding the left mouse button pressed.

Pan image

- Place the mouse pointer in the center of the image.
- Drag the image to the required position, holding the left mouse button pressed.

Reset

Reset the view to its original size and position:

- Click this button in the control area.

Saving 3D series and images

You can store series of images or projections that you have generated on the **3D** task card for documentation purposes.

You can either store the images quickly in a series that already exists or store the images in new series.

You can store reconstructed series automatically as new series after reconstruction.

Storing 3D images manually

Once you have generated a new series of parallel or radial images or projections on the **3D** task card, you can either store them quickly without comments, or store them with comments and sorted in your main database.

In **3D Configuration** *you can configure whether or not you want to save the reference image together with the series.*
(→ Page 137)

Saving images and series quickly

You can add individual images or your new series quickly and without comments to the existing images of a study.

You save the images under the patient's name in the loaded series.

- Click on the output segment and select an image, several images or an entire series.
- Select **Patient > Save**.

Or

- Click the **Save** button in the lower part of the control area.

Saving individual images as a new series

As an alternative, you can also group newly generated images in **3D** and save them in your main database along with comments. This makes it easier to find these images later.

- Select an image in a reference segment.
- Select **Patient > Save As...**.

Or

- Click the **Save As...** button.
  – The **Save As** dialog box is displayed.

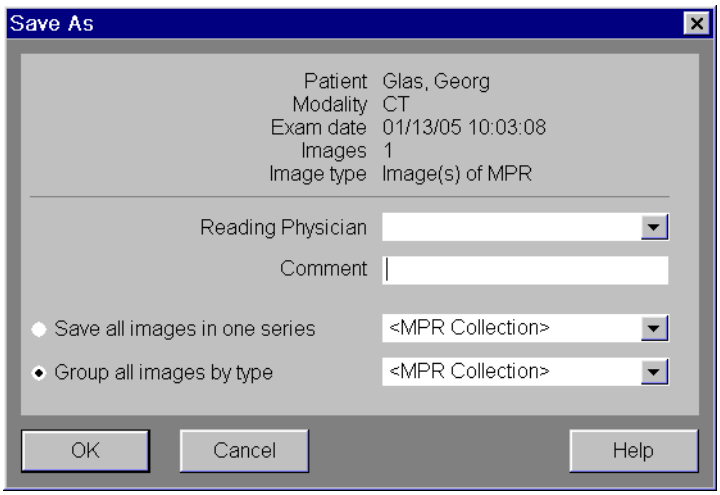


Image information

The following information is displayed in the upper part of the dialog box:

- ❏ Patient name
- ❏ Imaging method (modality)
- ❏ Exam date
- ❏ Number of images
- ❏ 3D output type (MPR, MPR Thick, MPR Curved, SSD)

This information is saved together with the series.

Reading physician

- ◆ Enter the name of the physician to whom you want to provide the series of a patient.

Comments

You can comment on a series. These comments are then saved together with the images.

- ◆ Enter a comment text.

The input field contains a default comment text which is the comment saved together with the original images. If various original images had different comments, then there will be no default comment text.

Saving images in a series

If you want to save all the images that you generate from a volume data set in one series, select the **Save all images in one series** option.

All the images are now saved in your main database under the same series name, regardless of the 3D output type they were generated with (MPR, MPR Thick, MPR Curved or SSD).

- ◆ Click the **Save all images in one series** option.
- ◆ Enter a series name or select a name from the selection list.

Every time you generate and save images in **3D** from your original data set, they are appended to the series entered here.

Grouping images by output type

If you generate images with different output types (MPR, MPR Thick, MPR Curved or SSD) when processing your original data set, you can save these images in your database sorted by output type.

- Click the **Group all images by type** option.
- Enter a series name or select a name from the selection list.

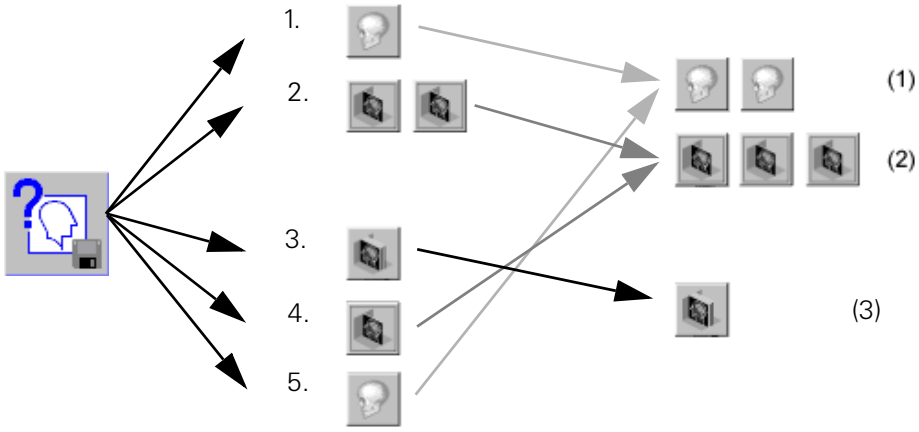
All images that you generate from this original data set are now saved under this series name and output type.

If you generate entire series of images, these will still always be saved with a different series name.

Example

You enter "Name" as the series name for your grouped single images. You then save 1 SSD image, 2 MPR images, 1 MPR Thick image, 1 MPR image, and again 1 SSD image in this sequence.

You thus generate 3 series:



(1) "Name" SSD Collection

(2) "Name" MPR Collection

(3) "Name" MPR Thick Collection

- Save your series by clicking **OK**.

Or

- Reject your entries by clicking **Cancel**.

Saving series automatically

In **3D Configuration** you can perform settings for automatic storage.
(→ Page 137)

Filming 3D images

- To copy the selected image to the film sheet, click this button in the lower part of the control area.

Depending on the selected film layout, the images are transferred directly to the camera or to the printer. Or they remain on the **Filming** task card for processing until you manually send the images to the camera or printer.
(→ Register Filming/Printing and Archiving)

In **3D Configuration** *you define whether or not you want to film/print the reference image together with the series.*
(→ Page 138)

Transferring images to the Viewing task card

- To load the images pertaining to the 3D scan into the **Viewing** task card, click this button in the lower part of the control area.

3D Image fusion (option)

The **Fusion** function allows you to combine the results of different acquisition techniques or acquisitions performed at different times by overlaying them.

For this purpose, two image series are loaded into the **3D** task card, aligned spatially and then overlaid by **Fusion**. The original data sets are merged to a new data set. In this new data set, matching image pairs of the two loaded series are superimposed and can then be displayed for diagnostic purposes like two slides, one on top of the other.

Options The following functions are optional:

- ❏ Aligning with reference points
- ❏ Automatic registration
- ❏ Surface matching

Caution

Using fused images for diagnosis.

Incorrect diagnosis

- ◆ Do not use fused images for diagnosis if the history of manipulations is not well known.

Fusion functions

To perform an evaluation with Fusion, you need to execute the following three steps:

- ❏ Load two different image series of a patient
- ❏ Align the two image series
- ❏ Edit the image data sets

Loading

In the first step you load two volume data sets in **3D**, one *reference series* and one *model series*.

The *reference series* serves as an anchor for subsequent overlaying of the two image data sets.

The *model series* is aligned spatially to the reference series.

Aligning

In the alignment step, the data of the model series are aligned spatially to the reference series.

You can align the two image series automatically (automatic registration), by selecting threshold values (surface matching), by assigning points (landmarks) or by shifting the model series visually (visual alignment).

Editing the Fusion image data set

Once you have successfully aligned the image data sets, they can be edited for a better display. You can window individual image series and the color display of the fusion images. You can then apply the whole range of 3D functions to the merged image data set.
(→ Page 60)

Calling up Fusion

To perform Fusion, you need two volume data sets, the reference series and the model series.

Both image series should cover approximately the same examination range.

If you select a data set that has already been processed with Fusion, it is loaded in 3D together with the previously stored alignment parameters. The overlaid series then do not need to be realigned.

Loading image data sets

You will normally select the two image series for your Fusion evaluation in the **Patient Browser** and transfer them to the **3D** task card one after the other.

If you had already processed the reference series in **3D** with another function (e.g. editor), you can load the missing model series from the **Patient Browser**.

If you load image series of different patients, you have to confirm a corresponding message. The resulting images are identified in the image text.

Caution

Unintentional loading of image data sets of different patients

Mix-up of patients and incorrect diagnosis possible.

- When loading reference and model series, make sure you select the correct patient data.

Loading new series

- Open the **Patient Browser** (**Patient > Patient Browser**).
- Select the series whose images you want to use as reference images in the navigation or content area.
- Select **Applications > 3D > MPR** in the main menu.

Or

- Click the **3D MPR** button on the tool bar of the **Patient Browser**.

If you have activated **Close after Loading***, the* **Patient Browser** *is closed as soon as the images have been loaded.*

- Select the series whose images you want to use as model images in the navigation or content area of the **Patient Browser**.
- Select **Applications > 3D > Fusion** in the main menu.

Or

- Click the **Fusion** button on the tool bar of the **Patient Browser**.

Loading the model series subsequently

You have already loaded an image data set into the **3D** task card and now want to superimpose it with another image data set.

- Open the **Patient Browser** (**Patient > Patient Browser**).
- Select the series whose images you want to use as model images in the navigation or content area of the **Patient Browser**.
- Select **Applications > 3D > Fusion** in the main menu.

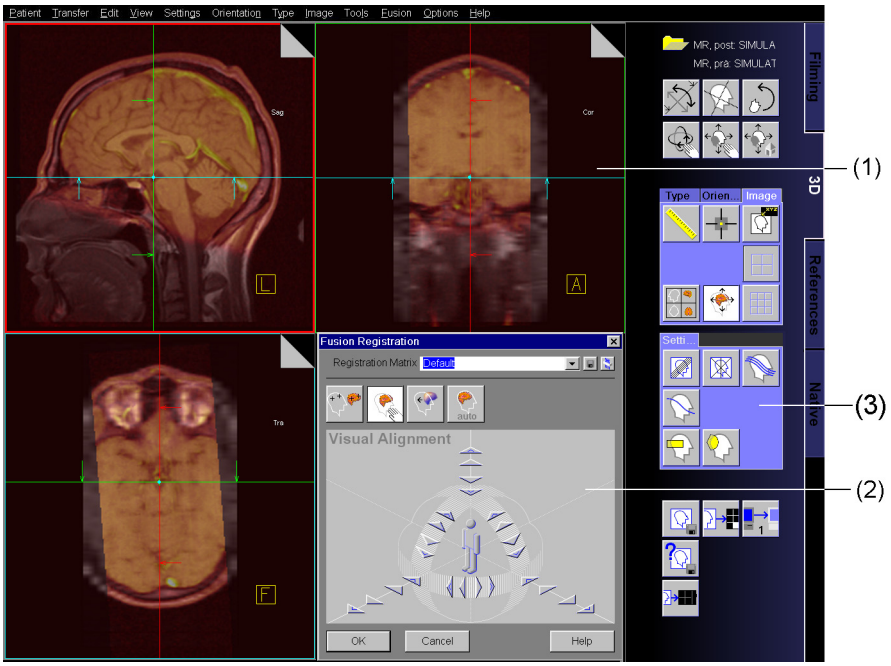
Or

- Click the **Fusion** button on the tool bar of the **Patient Browser**.

3D card in Fusion mode

The images of the loaded reference and model series are displayed overlaid in the first three segments.

In the fourth segment, a dialog box is displayed in which you can set the alignment of the images in the reference and model series.



(1) **Image area**
Three orthogonal views of the loaded images.

(2) **Fusion Registration dialog**
Control elements for image overlay.

(3) **Settings subtask card**
Buttons for overlaying and displaying images.

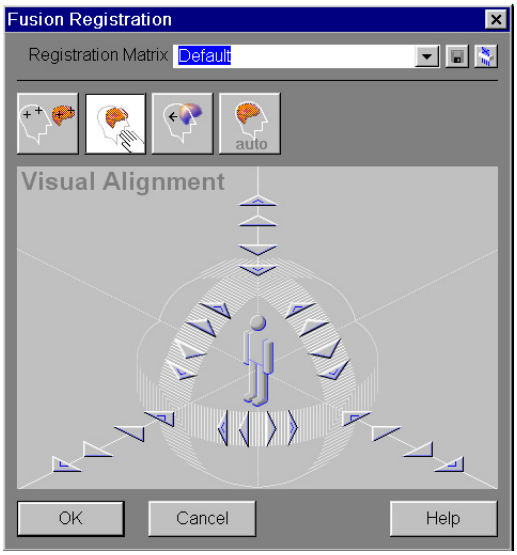
Aligning image series

As soon as you have loaded image series for processing with **Fusion**, you can align them to one another with respect to orientation and rotation. These steps are performed in the **Fusion Registration** window.

- Select **Fusion > Fusion Registration** in the main menu.

Or

- Click the **Fusion Registration** button on the **Image** subtask card.



The **Fusion Registration** window contains the following functions:

❏ **Registration matrix**
Lists all available matrices (user defined, initial and default matrix). Enter a name, save the current registration as a new matrix, or delete it.

❏ **Landmarks**
Both loaded image series are made to match using suitable reference points.

❏ **Visual Alignment**
The two loaded image series are (manually) made to match visually.

❏ **Automatic Registration**
The two loaded series are automatically made to match.

❏ **Surface Matching**
The two loaded image series are made to match on the basis of preset threshold values specific to the tissue structure.

Registration

You can save intermediate steps or the final result of a **Fusion** registration by saving the corresponding registration matrix. You can also assign the initial or the default matrix.

The matrix is saved to the local database. You can find it in the "3D Application Data" series of the reference series as a non-image object.

When you register a series for the first time (no matrix has been defined), only the "Initial" and "Default" matrixes are shown.

Initial If the last alignment that you saved is unsuitable, you can return to the initial position.

- Choose the **Initial** matrix from the registration matrix list.

Default If you are working with a combination scanner (e.g. CT-PET scanner), you have an additional option: calling up a default alignment stored in the system and applying it to the alignment of a reference and model series.

- Choose the **Default** matrix from the registration matrix list.

User Defined After aligning the series (which modifies the matrix) and clicking the **Save Registration** button, a matrix with the name "User Defined" is stored for this registration (you can change the name of the matrix).

Later you can save further versions or update existing ones.

Re-using matrices The next time the two series are loaded, the matrix last used is automatically assigned. You can change this matrix and save it under a different name.

It is possible to re-use a matrix for a registered series together with another series, if these series are geometrically compatible.

Saving a registration matrix

In the **Fusion Registration** dialog, enter a new name in the registration matrix field, overwrite an existing name, or keep the current name to save the matrix as an updated version.

It is not possible to overwrite the "Default" and "Initial" matrices. If you overwrite the name, the matrix is stored with the generated name "User Defined" instead.

- Click the **Save Registration** button.

Deleting a stored matrix

- Select the name of the matrix to be deleted from the list.

- Click **Delete Matrix**.

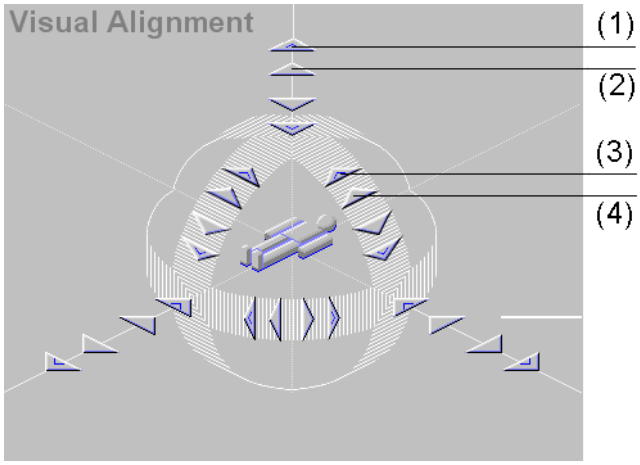
The selected matrix is deleted from the list and from the local database.

It is not possible to delete the "Default" and "Initial" matrices.

Aligning images visually

With **Visual Alignment** you make the reference and model series match by aligning the model images in the three segments with the reference images step by step.

◆ In the **Fusion Registration** window, click **Visual Alignment** to display **Visual Alignment** functions.



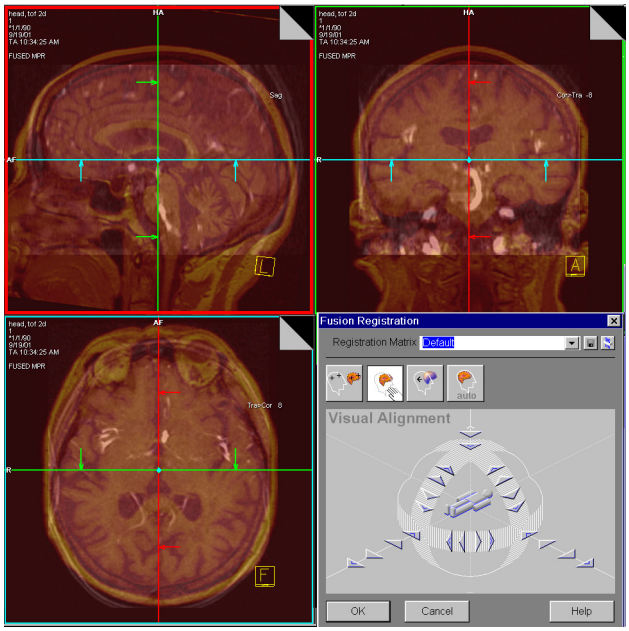
(1) Double direction arrow
for large image movements

(2) Single direction arrow
for small image movements

(3) Double rotation arrow
for large image rotations

(4) Single rotation arrow
for small image rotations

The two image series are displayed overlaid. In three segments of the image area you can see the reference and model images in three orthogonal views. To help you distinguish between them, they are displayed in different colors.



Processing images

Using **Zoom/Pan** and **Rotate object**, you can find the most suitable position to start the alignment of the two series.

- Select **Zoom/Pan** via SmartSelect.

Or

- Click the **Zoom/Pan** button in the upper part of the control area.
- Zoom or pan the image.
- Select **Rotate object** via SmartSelect.

Or

- Click the corresponding button in the upper part of the control area.
- Rotate the image.

Moving a model series

- Activate the **align model** option via SmartSelect, if necessary.
- Drag the model series from the center of the segment into the desired direction while keeping the left mouse button pressed.

Or

- Click on a single direction arrow in the overview drawing of the **Visual Alignment** window.

The model series moves by 1 mm in the selected direction.

Or

- Click on a double direction arrow.

The model series moves by 10 mm in the selected direction.

Rotating a model series

- Activate the **align model** option via SmartSelect, if necessary.
- Move the mouse pointer along the edge of the segment to rotate the model series in the plane while keeping the left mouse button pressed.

Or

- Click on a single rotation arrow in the overview drawing of the **Visual Registration** window.

The model series turns in the selected direction in steps of 1°.

Or

- Click on a double rotation arrow.

The model series turns in the selected direction in steps of 10°.

Saving alignment images

You can immediately save any promising alignments you have performed.

You can access these versions whenever you need them by selecting the corresponding matrix from the registration matrix list.

Whenever you achieve an improvement by rotating and moving the images, you should save the new alignment to the database. You can then return to a previous result if the two series start to drift apart again.

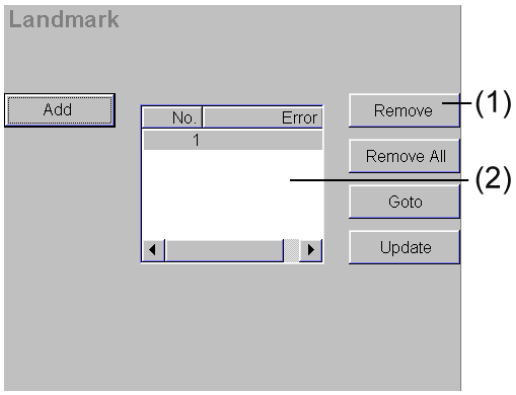
- Click the **Save** button to save the current alignment matrix.

You can save the alignment as often as you want. The previous result is then overwritten by the new one.

Aligning images with reference points

You align image series with reference points, if you have detected distinctive structures in both data sets.

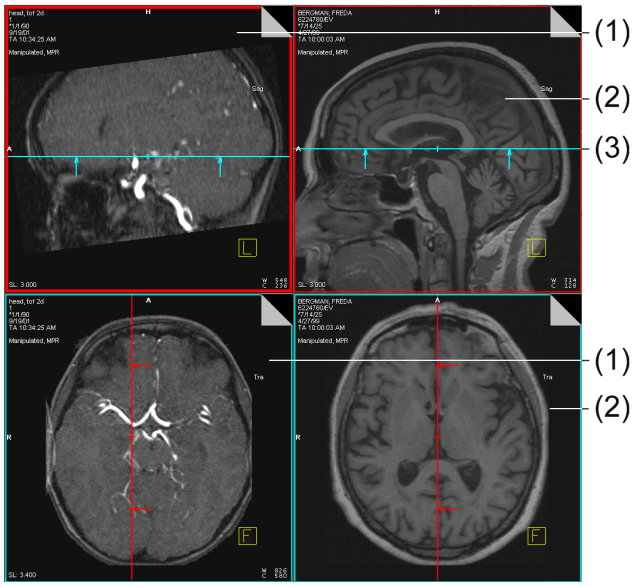
- In the **Fusion Registration** window, click the **Landmarks** button to display the functions of **Landmarks**.



(1) **Buttons**
for setting and editing reference points.

(2) **List of reference points**
with deviation from the current alignment
(when there are at least three defined reference point pairs).

The reference series is displayed in the two left segments and the model series in the right segments of the image area. You can address all the image segments separately.



(1) **Reference images**
sagittal view above, axial view below

(2) **Model images**
sagittal view above, axial view below

(3) **Reference lines with cross hairs**
on all images

Defining reference points

First you define a reference point at a distinctive place in the volume. The you set the associated second reference point at a relevant position in the other series. Thus you obtain a reference point pair which is used as a basis for aligning the model series to the reference series.

- In the reference segments, set a view in which you can clearly see the position for the reference point.
- Keeping the left mouse button pressed, move the cross hairs in one of the reference segments to the desired reference point position.
- In the other reference segment, check whether the cross hairs are positioned correctly and move them, if necessary.
- Now proceed in the same way to define the associated reference point on the model side.

- Click **Add** to apply the reference point pair.

The new reference point is numbered and entered in the list of reference points. Your system now "anchors" the model series with the reference series at the defined reference points.

The more points you define, the more precise the overlaying of the two image series will be. You must define at least three reference points to determine the spatial alignment of the series. You can define up to 100 landmarks.

Displaying a reference point

- Click on the entry in the list that refers to the reference point.

- Click the **Goto** button.

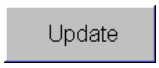
Or

- Double-click the relevant entry.

The cross hairs jump to the position of the selected reference point The displayed reference point is marked in the table with a blue background.

Defining a reference point

- Display one of the reference points.
- Keeping the left mouse button pressed, move the cross hairs in both series to the required position.



- Click **Update**.

Deleting a reference point

- Display one of the reference points.

- Click **Remove**.

The selected reference point is deleted.

Deleting all reference points

- Click **Remove All** to delete all defined reference points.

A dialog box is displayed in which you must confirm the deletion of all reference points.

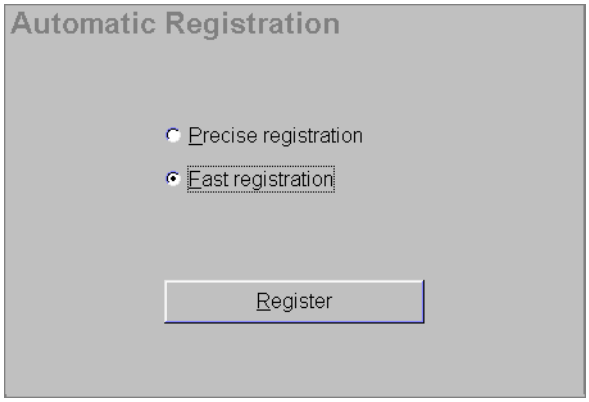
Saving alignment images

- Click **Save** to save the current alignment matrix.
(→ Page 113)

Automatic registration

With **Automatic Registration** the model series is automatically aligned with the reference series. This procedure is used mainly for image series of different modalities from the same patient.

- In the **Fusion Registration** window, click the **Automatic Registration** button to display the function of **Automatic Registration**.

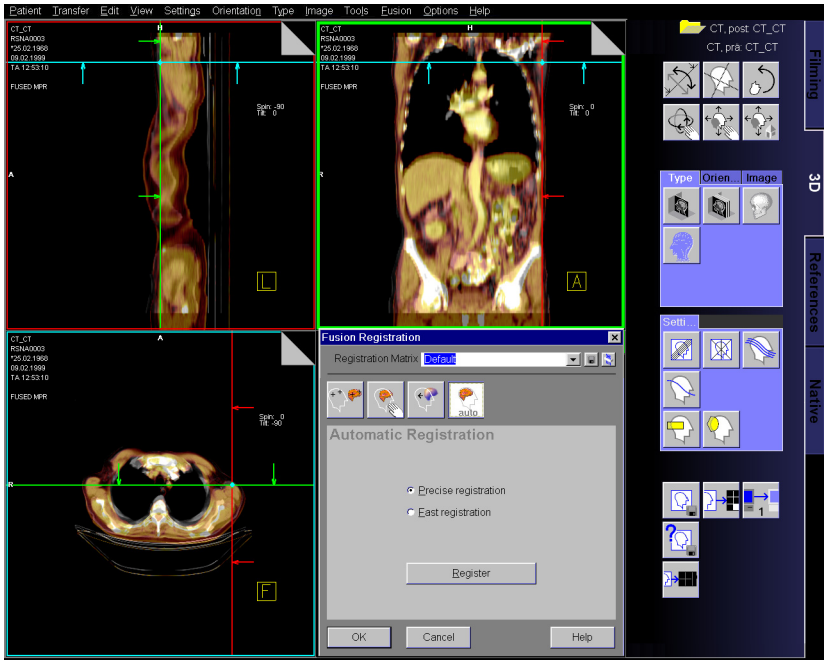


It is important that the model series in the segments is roughly aligned with the reference series.
(→ Page 112)

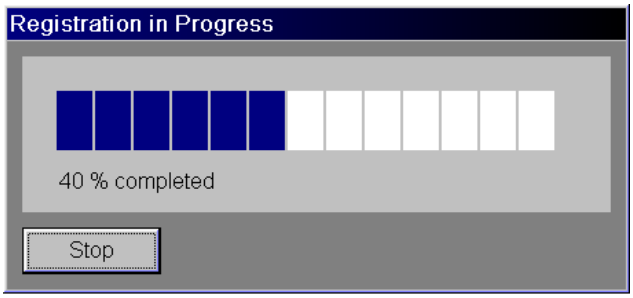
- Select **Precise registration** for highly precise, or **Fast registration** for fast overlaying.

- Click on the **Register** button.

The two image series are now made to match and successively aligned with each other. You can watch the progress of overlaying in the image area in the 3 orthogonal views.



The dialog display shows the progress of the alignment operation.



- Click **Stop** if you are satisfied with the results and do not want to wait until the operation has been completed.

The alignment obtained so far is retained.

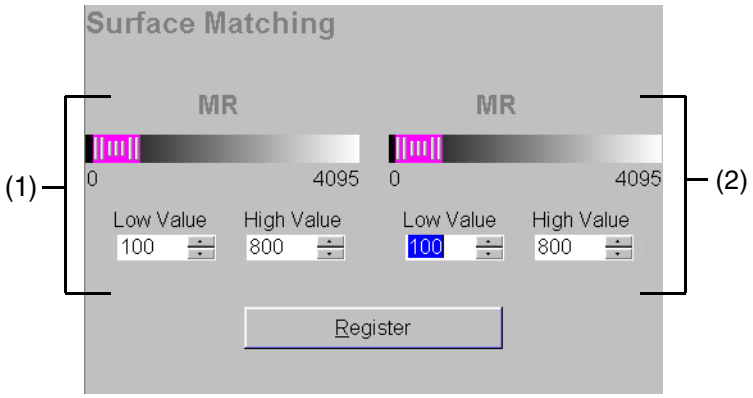
Saving alignment images

- Click the **Save** button to save the current alignment matrix. (→ Page 113)

Surface matching

With **Surface Matching** you align the model images with the reference images on the basis of threshold values that correspond to a specific tissue structure. This procedure is used in follow-up examinations to compare different data sets of the same patient.

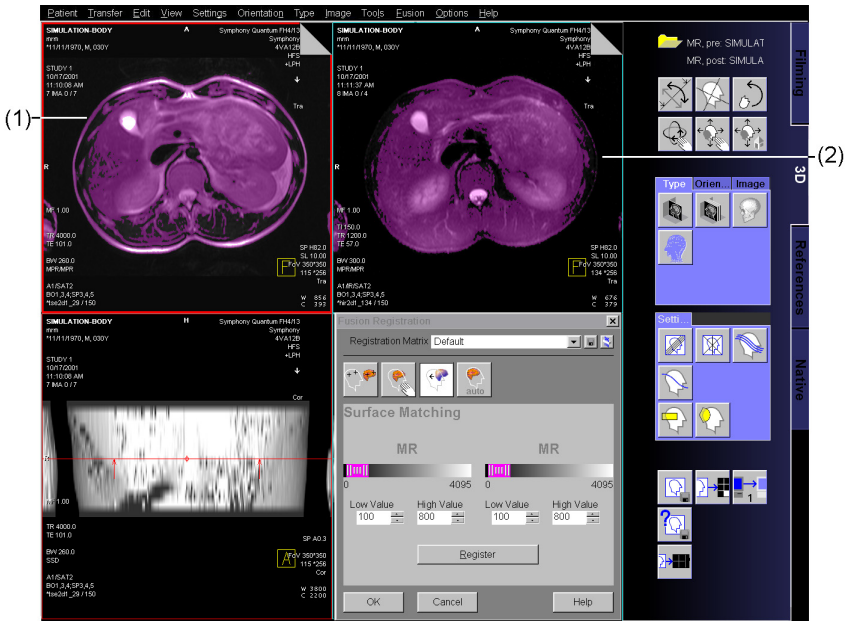
- In the **Fusion Registration** window, click the **Surface Matching** button to display the functions of **Surface Matching**.



(1) Threshold values of the reference series (*here*: modality MR)

(2) Threshold values of the model series (*here*: modality MR)

The reference series is displayed in the two left segments and the model series in the right segments of the image area.



(1) **Reference images**
axial view (MPR) above, coronal view (SSD) below

(2) **Model images**
axial view (MPR) above, coronal view (SSD) below

Entering threshold values

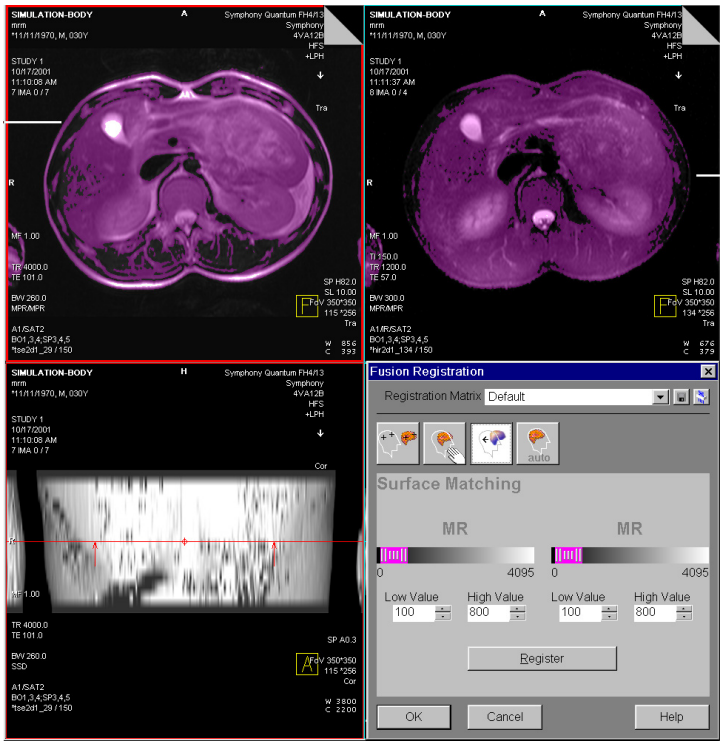
- Select a tissue structure for which you want to make the two image series match (e.g. bone, skin).
- Set modality-specific threshold values corresponding to this tissue structure for the reference series.
- Select the corresponding threshold values for the model series.

The image areas inside the value range are highlighted in color in the corresponding segments.

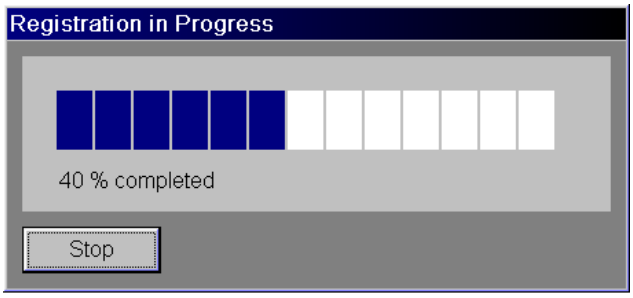
Starting overlaying

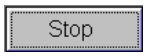
◆ Click the **Register** button in the **Fusion Registration** window.

The two image series are now made to match and successively aligned with each other. You can watch the progress of overlaying in the image area in the 3 orthogonal views.



A progress bar shows the progress of the alignment process.



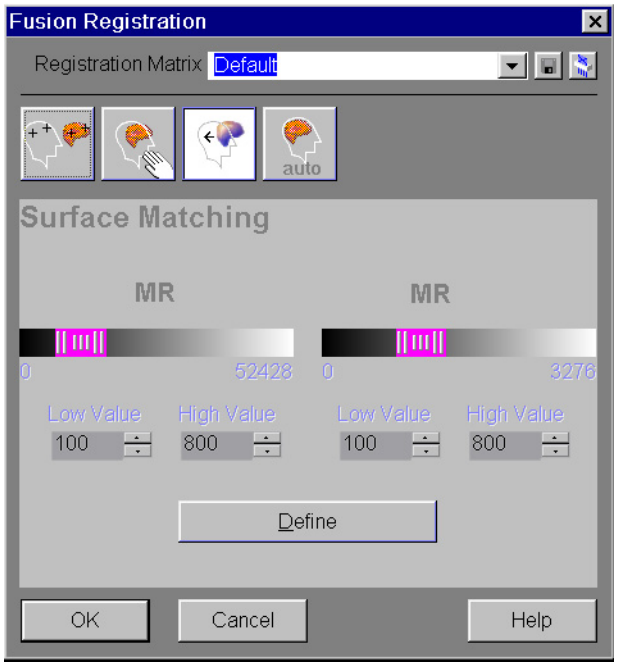


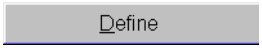
◆ Click **Stop** if you are satisfied with the results and do not want to wait until the operation has been completed.

The alignment obtained so far is retained.

Changing threshold values

As soon as you have started overlaying, the **Register** button changes to **Define**. With **Define** you have the possibility to repeat overlaying with other threshold values.





◆ Click **Define**.

The images of the reference and model series are now displayed side by side again and the threshold values can be changed.

Saving alignment images

◆ Click **Save** to save the current alignment matrix.
(→ Page 113)

Terminating alignment

If you have aligned the model series and reference series with sufficient precision, you can store the superimposition in the local database.

Applying alignment

◆ Click **OK** to keep your alignment defined so far.

Canceling alignment

◆ Click **Cancel** to abort alignment of the images.

Displaying overlaid images

Once you have aligned the image data sets and confirmed the alignment, you can display the image data sets either next to each other (side by side) or overlaid (Fusion).

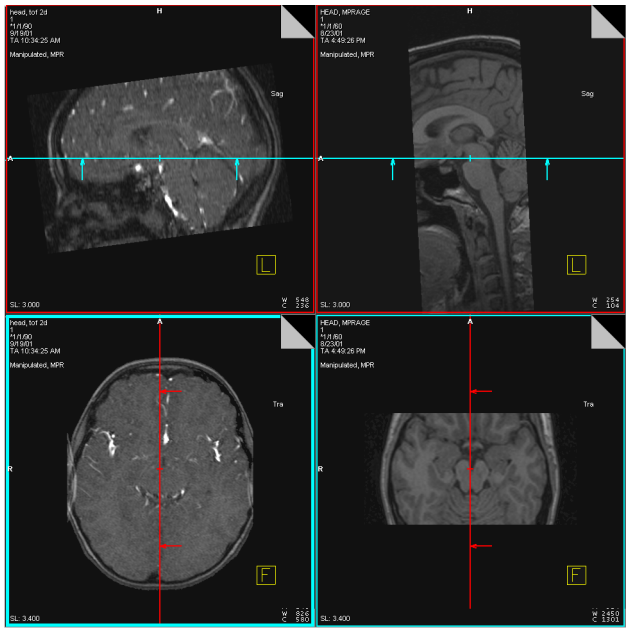
Side-by-side mode

In side-by-side mode, the two image data sets are arranged side by side (in separate segments).

- Select **Fusion** > **Fusion: Side by Side** in the main menu.

Or

- Click the **Side by Side** button on the **Image** subtask card to activate side-by-side display.



The left image area is used to display the reference images and the right one is used for the model images. For easier spatial assignment, two coupled mouse pointers are displayed that move across both data sets simultaneously. The coupled mouse pointer is colored.

Changing the view

In Side by Side mode you move through the image stacks in the reference segment. The corresponding segment is automatically displayed on the model segment. You can change the view of the fused image data set using one of the following methods:

- ❏ Scrolling
  (→ Page 47)
- ❏ Rotating the volume with the mouse
  (→ Page 48)
- ❏ Setting standard views
  (→ Page 55)
- ❏ Using the cross hairs
  (→ Page 45)

Setting the display mode

In Side by Side mode, the following display modes are possible:

- ❏ MPR Thick

- ❏ Fused MPR

- ❏ SSD

◆ Click the corresponding button on the **Type** subtask card.

Terminating Side by Side mode

◆ Click the **Side by Side** button to close the Side by Side view.

The fused data set is now displayed in Fusion mode.

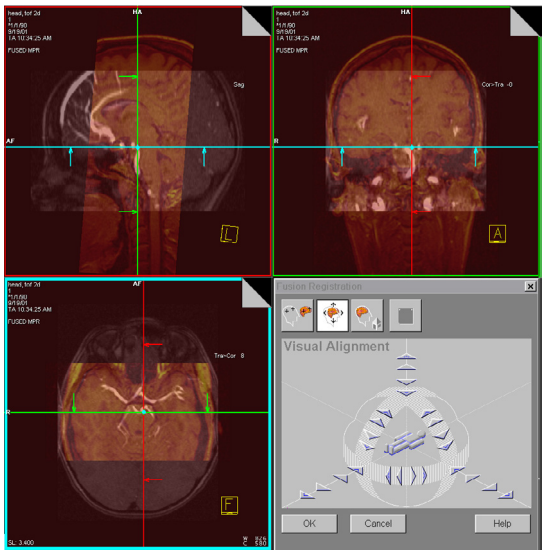
Fusion mode

In Fusion mode, the two image data sets are displayed one on top of the other like two slides.

- Select **Fusion > Fused MPR** in the main menu.

Or

- Click the **Fused MPR** button on the **Type** subtask card to switch the display of the selected image to Fusion mode.



To help you distinguish between the two image data sets, they are displayed in different colors. The overlaid image data set is displayed in three orthogonal views in three segments, as with **Visual Alignment**.

Changing the view

In Fusion mode you move through the image stacks in each segment. You can change the view of the fused image data set using one of the following methods:

- ❏ Scrolling
  (→ Page 47)
- ❏ Rotating the volume with the mouse
  (→ Page 48)
- ❏ Setting standard views
  (→ Page 55)
- ❏ Using the cross hairs
  (→ Page 45)

Modifying the display

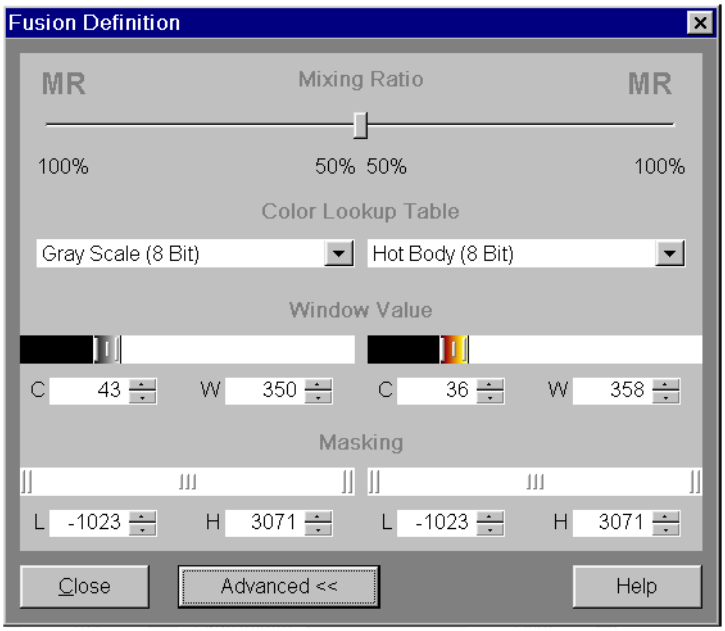
Once you have successfully overlaid your images, you can optimize the window values, the mixing ratio and color display of the images so that you can recognize the structures of individual image data sets more easily.

- Select **Fusion > Fusion Definition** in the main menu.

Or

- Click the **Fused MPR** button with the right mouse button.

The **Fusion Definition** dialog box is displayed.



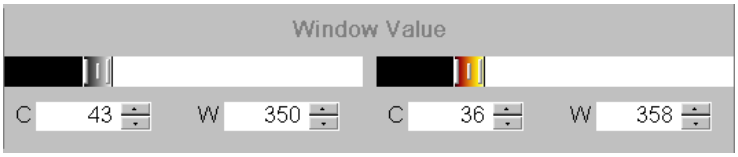
Windowing in a segment

- Starting in the left half of a segment, drag the mouse to change the window center (brightness) and window width (contrast) of the reference series using the middle mouse button.

Or

- Starting in the right half of a segment, drag the mouse to change the window center (brightness) and (window width) of the model series.
(→ Register Viewing, Page 37)

Windowing in the dialog box



- Move the slider for the relevant data set to change the window center (brightness).
- Move the right or left edge of the slider to change the window width (contrast).

Or

- Enter numerical window values into the input fields and confirm with the **Enter** key.

With nuclear medical images the slider determining the width of the windowed area can also be moved beyond the limits of the range displayed in the dialog box.

SUV (Standard Uptake Value)

The SUV (Standard Uptake Value) check box is displayed for PET images only.

- Check this box to use the value for SUV activity in tissue rather than the default percentage values.

Caution

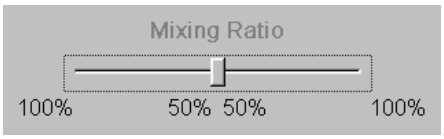
SUV calculation is based on the data with the earliest acquisition date and time within the selected and loaded data set and the first image (with the earliest acquisition date and time) is not within the selection.

Incorrect SUV calculation.

- Make sure that you have selected the first image of the data set so that the calculation is performed correctly.

Mixing ratio

To emphasize certain information of one of the two image data sets, increase its relative importance in the fused image.



- Using the left mouse button, pull the slider in the direction of the data set whose intensity you want to increase.

Display

To delimit the reference and model series more precisely, you can change the coloring of the image data sets.

- Select the required color representation (LUT, lookup table) in the selection list for the reference and model data set.

Advanced

The **Fusion Definition** dialog box provides an advanced masking section for hiding pixel ranges in the fused display.

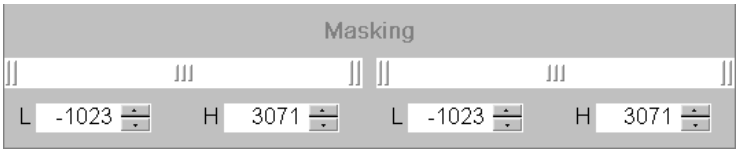
- Click the **Advanced >>** button.

The **Fusion Definition** dialog box is enlarged, allowing you to define which pixel ranges are to be masked out.

If you want to hide the numerical setting area, simply click the **Advanced <<** *button again.*

Masking

Using the **Masking** function, you can define individual thresholds for the reference and model series display. Only grayscale values that are within the thresholds are used for alpha-blending.



- Resize the slider with the left or right side handle to change the covered range of pixels.

Or

- Enter the value into the corresponding L(ow) or H(igh) fields.

Or

- Drag the slider to move the complete range to another position.

The displayed blended segments immediately reflect the change. All pixels outside the threshold interval are ignored. They are not blended with the other series.

The masking thresholds are also stored with the registration matrix, together with all the other blending parameters.

Saving result images

You can save the resulting fusion images to the local database, send them to a DICOM node, or copy them to the **Filming** task card.

The images are saved as they are currently displayed.

Fusion mode If you save a selected image in **Fusion** mode, the stored image will be of the DICOM Secondary Capture type ("SC" modality).

Side by Side mode If you save images in the **Side by Side** mode, the currently displayed type will be used (e.g. MPR).

If fusion results originate from two series of different patients, this is indicated in the image text.

Results for non-3D applications

It is possible to save **Fusion** results for other common viewing applications, such as the syngo Viewer or MagicView. These viewers are used to compare the original images with the fused images.

You have to save two or three different image series with the correct position, thickness and orientation.

- ❏ The first series is a 3D range of the reference series.
- ❏ The second series is a 3D range of the model series.
- ❏ The third series is a 3D range of images that have been fused from the two series (optional).

There are two possibilities of generating these different series:

- ❏ Resampling data
- ❏ Generating ranges

Resampling data

◆ Select **Fusion > Resample Data** in the main menu if you want the data to be resampled.

Depending on the configuration, three new series with the position, thickness, orientation and resolution of the reference series are generated and stored in the local database together with the registration matrix:

❏ the resampled data set of the model series: "Resampled<Modality><#>"

❏ the resampled data set of the fused images:
"Resampled<Modality of Reference><Modality of Model><#>"

❏ registration matrix: "ResampledRegistration<#>"

"#" starts from 1 and is incremented with each recalculation.

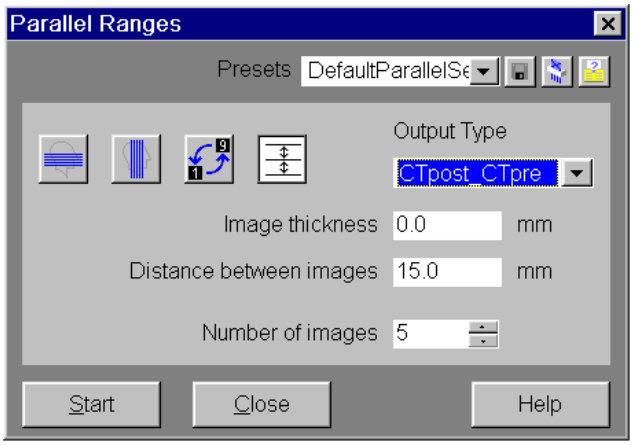
⇨ Further details on the configuration see (→ Page 138).

During resampling, the result images will not be displayed. The progress of the resampling process is shown in the **3D: Resample Data in Progress** *dialog.*

Generating ranges

◆ Select **Settings > Parallel Ranges** in the main menu.

A range is reconstructed from alpha-blended images and the **Parallel Ranges** dialog is displayed.



◆ Select the modality of the reference series (e.g. MR) from the **Output Type** dropdown list.

The **Output Type** *list is visible only if a second data set is loaded and Parallel Ranges or Expand Ranges is active.*

◆ Enter the required range parameters and click **Start**.

◆ Save the reconstructed range.

◆ Repeat the last two steps.

It is important that you do not change the range parameters or range graphics when performing these steps.

◆ Select the first modality of the model series, e.g. PET, reconstruct the range and save it.

◆ Then select MR_PET, for example, for the reconstruction of a range of fused images.

If both data sets have the same modality, "pre" and "post" is added. "<MOD>pre" or "<MOD>post", e.g. "PTpre".

The resolution of the reconstructed range of the "from model" output type depends on the configuration.
(→ Page 138)

Configuration for 3D

You can adapt several settings in the **3D Configuration**:

- ❏ Displaying the orientation description
- ❏ Saving images with reference lines
- ❏ Automatic storage of ranges
- ❏ Saving ranges with the reference image
- ❏ Filming ranges with the reference image
- ❏ Using the stored orientation for the reference image
- ❏ Resampling data (Fusion)

Calling up the configuration window

You can call up the configuration window from the syngo **Configuration Panel**.

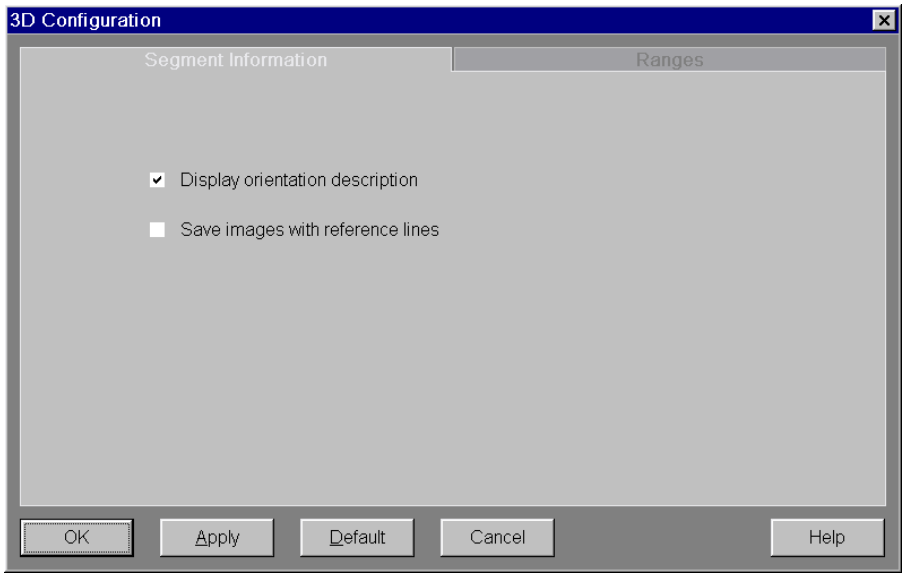
3D

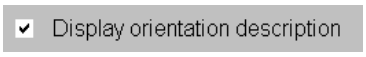
- ◆ Select **Options > Configuration** in the main menu.
- ◆ Double-click the icon for the **3D** configuration window.
  – The **3D Configuration** window with the tab cards **Segment Information** and **Ranges** is displayed.

Configuring image information

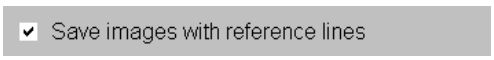
In the images, various image texts and orientation aids are displayed, the following of which you can configure:

◆ Click the **Segment Information** card into the foreground.





◆ Activate this check box, if you want to display the orientation description.

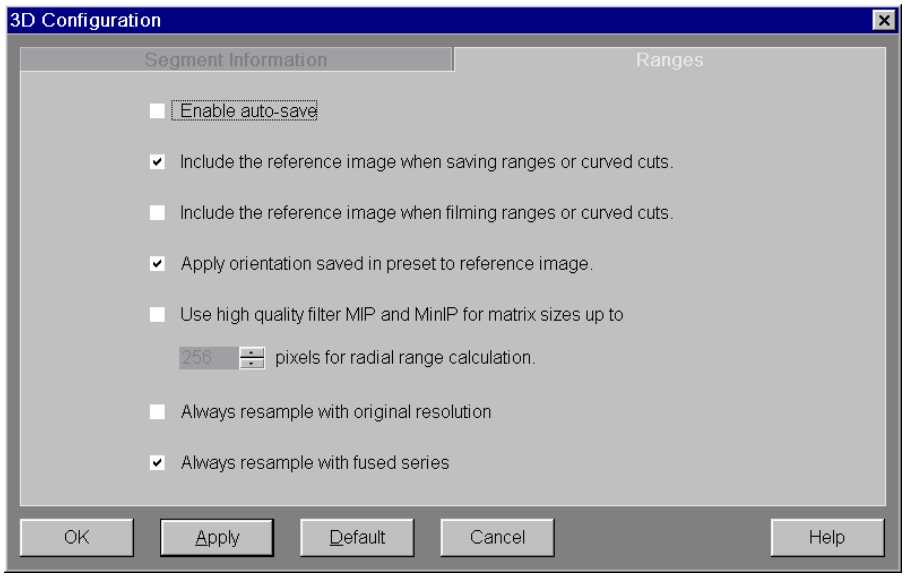


◆ Activate this check box, if you want to save the reference lines together with the images transferred into the **Viewing** or **Filming** task card.

Configuring the processing of ranges

On the **Ranges** card, you can define the settings for storing and filming ranges. In addition, you can configure the orientation of the reference image for generating parallel and radial ranges.

◆ Click the **Ranges** subtask card into the foreground.


3D Configuration
Segment Information
Ranges
Enable auto-save
Include the reference image when saving ranges or curved cuts.
Include the reference image when filming ranges or curved cuts.
Apply orientation saved in preset to reference image.
Use high quality filter MIP and MinIP for matrix sizes up to
256
pixels for radial range calculation.
Always resample with original resolution
Always resample with fused series
OK
Apply
Default
Cancel
Help

Configuring storage

You can store reconstructed series (ranges) fully automatically with or without the reference image.

◆ Activate this check box, if you want all reconstructed ranges to be stored automatically.

Automatic storage quickly produces large volumes of data that use up the memory of your hard disk. Check the data stored on your hard disk at regular intervals. Archive data that you still require and delete data that you no longer need.
(→ Register Filming/Printing and Archiving, Page 65)

◆ Activate this check box, if you want to store the reference image together with the range.

Configuring filming

You can film reconstructed ranges with or without the reference image.

- Activate this check box, if you want to film the reference image together with the range.

Configuring the orientation of the reference image

When generating parallel ranges using the stored defaults, you have the option of having the preset reference image orientation used automatically.

- Activate this check box, if you want to use the stored orientation for the reference image.

Configuring resampling

For resampling you can either use the original resolution or fused series.

- If you want the resampled series to have the same resolution as the reference series, click **Always resample with original resolution**.

This also applies for generating the model series.

- If you want to resample the fused series, click **Always resample with fused series**.

SIEMENS

Operator Manual
ARCADIS Orbic

Filming/Printing and Archiving

SP

SPR2-320.620.01.02.02

Please observe the

Safety register

This must be studied thoroughly before system startup.

The original version of this manual was written in the German language.

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SP

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Introduction to filming/printing

You can expose the images of an examination on film or print them on paper for documentation and reporting.

Filming and printing are the same process except that they use different output devices. Even though the following text may only use the term "Filming" (e.g. with software elements), the description applies equally to printing.

Film job Selected images, series and studies that you have sent for filming are managed and executed by the system as film jobs.

Multiple film job In general, images of different patients are processed in different film jobs. However, you can permit images of different patients to be grouped together as a multiple film job.

Film task status You can also obtain information about the processing status of film jobs in the camera/printer queue in the **Film Task Status** dialog box and intervene in the sequence of execution.

Film preview Images in film jobs are not immediately printed or exposed on film, but are first transferred to a virtual film sheet. In the **Film Preview** window, you can see how the images will later be arranged on the exposed film or printout.

Filming task card In addition to the **Film Preview** dialog, the **Filming** task card is also available to you as a virtual film sheet. Besides the basic functions of the **Film Preview** window, the **Filming** task card provides a number of additional functions and configuration possibilities that enable you to adapt the filming and printing process to your specific requirements.

Please remember that not all transfer options may be available on your system. The devices and network nodes available depend on the individual configuration of your system and the options installed.

Filming and printing

Image material is filmed/printed in two steps:

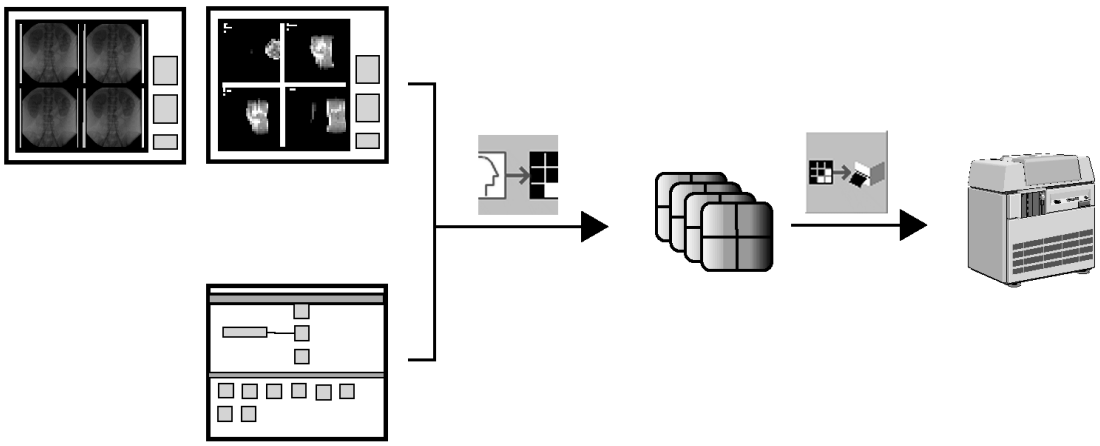
- ❏ First, specify on one of the task cards or in the **Patient Browser** which images or series you want to print or expose on film. Then transfer the selected images to the virtual film sheet.
- ❏ From the virtual film sheet, you can either send your selected images directly to a camera/printer, or you can perform additional processing steps first.

If a local printer is connected, you can print individual images on paper or X-ray film directly in the OR.
(→ Page 11)

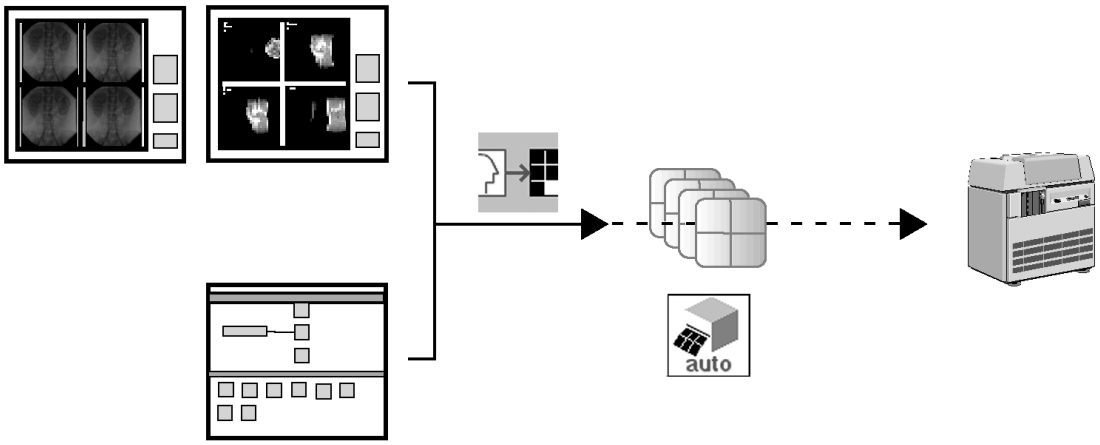
Image material can be printed or exposed on film either automatically or manually.

Manual filming

You transfer images to the virtual film sheet. After that, you manually initiate the transfer to the camera or printer. In doing so, you can select the images that you want to expose on film or print.



Automatic filming You transfer images to the virtual film sheet. As soon as a film sheet is filled, the images are automatically output on a camera or printer.



Layouts and settings

All film settings such as the layout of the film sheet or the selected camera/printer are defined in so-called film layouts.

Standard layout

Provided that you do not make any changes to the default film settings, you always work with the general default layout defined by Siemens Service during installation of your system.

Changing film settings

If you are not satisfied with the default film settings (default layout), you can change individual film settings using the virtual film sheet. The current film job is then processed with your new settings. For the next film job, the system will use the default settings again.

Study-specific layouts

In the **Configuration** of the **Filming** task card, you can define special film settings for individual studies and series. Whenever you film or print images of a study or series of the same type, the system automatically uses this study-specific layout.

Print modes

The regular page mode is the default print mode. The scalable page mode provides images with reduced quality and does not support original size.

The Filming task card

If you want to change individual film sheets of the jobs in the queue or if you want to process images again before they are filmed, switch to the **Filming** task card.

The **Filming** task card is divided into four main areas.

(1) Menu bar with film-specific menu entries

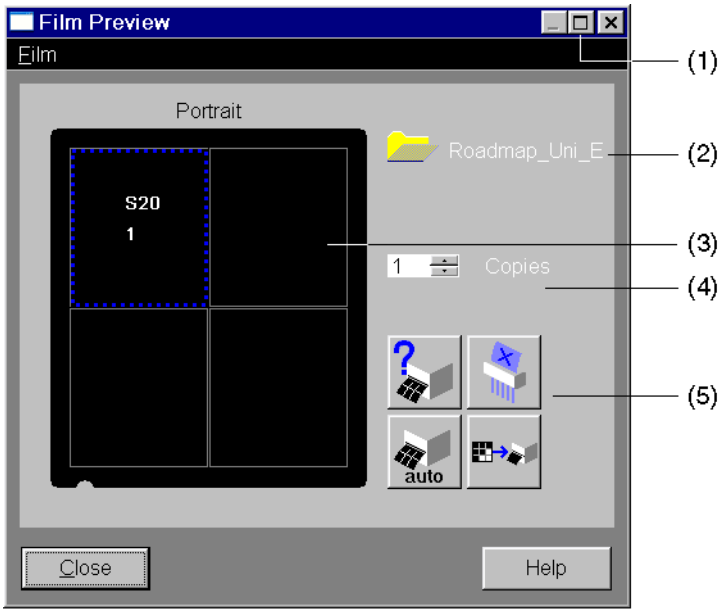
(2) Control area allowing easy access to processing functions

(3) Display of the film sheets (virtual film sheet)

(4) Status bar for system messages

The Film Preview window

If you want to obtain a quick overview of queued film jobs that have not yet been sent to the camera or printer, you can use the **Film Preview** window.



(1) Maximize to **Filming** task card

(2) Film jobs

(3) Display of film sheets

(4) Spin box for selecting the number of copies

(5) Buttons for film control and delete button

The **Film Preview** *dialog can be opened only from the* **Patient Browser**, *using the* **Patient > Film Preview...** *menu.*

The filming and printing of examination images is performed in two steps:

❏ Transfer of images to the virtual film sheet.

❏ Transfer of these images from the virtual film sheet to a camera or printer where they are exposed on film or printed on paper.

Configured printers/cameras

Siemens Service or your system administrator has configured one or several printers/cameras for your ARCADIS Orbic system. At the same time, the names of output devices that you can choose from selection lists as well as the specified paper/film size were set up.

Note that you can only print on the paper/film size that was configured for the respective output device.

Transferring images to the virtual film sheet

Images can be transferred for printing from different applications via the control panel on the C-arm system or at the monitor trolley.

At the C-arm system

If a local printer is connected, you can print individual images on paper or X-ray film directly in the OR.

Initiating local printing

◆ Press the **Print** key on the control panel of the C-arm system.
– The currently selected image is copied to the virtual film sheet.
– Depending on the setting made for exposure on film, the image is transferred directly to the specified (local) printer and printed there.

At the monitor trolley

You have the possibility of selecting and filming/printing single images or all images of a series, a study or a patient.

Selecting images

You decide on the **Viewing** task card or in the **Patient Browser** window which images you want to transfer to the virtual film sheet. You can use the large format layout when selecting images in the **Viewing** task card.

- Select **Patient > Patient Browser**.
  – The **Patient Browser** opens.
- Select the images for filming in the navigation or content area.

Or

- Load the series or study containing the images that you want to film into the **Viewing** task card
  (→ **Viewing** register, Page 15).
- Select the images for filming in the image area.

Transferring images

- Select **Patient > Copy to Film Sheet**.

Or

- Click the **Copy to Film Sheet** button.

Or

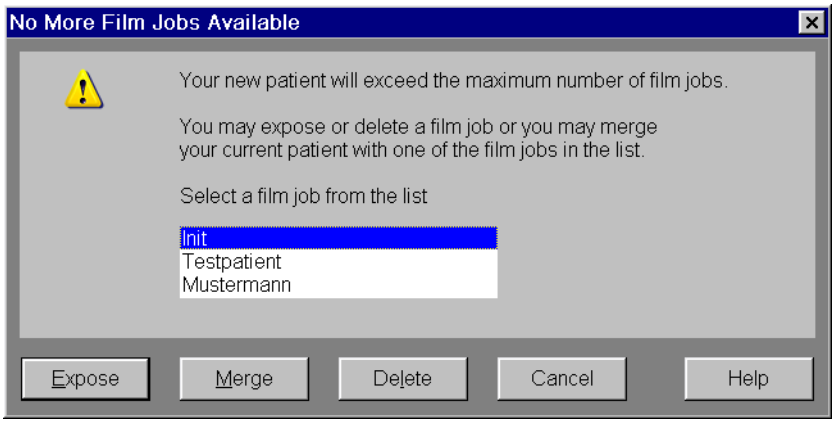
- Press the **Copy to Film Sheet** key on the symbol keypad.
  – All the selected objects are transferred to the virtual film sheet.

You cannot transfer scenes from the **Patient Browser** *to the* **Filming** *task card. If one of the images selected for transfer is a scene, you will receive a corresponding message.*

Virtual film sheet full

In general, every time you transfer images of a series or whole studies of a patient to the virtual film sheet, a film job is created.

No more than 3 film jobs can be managed in the virtual film sheet at one time. If a fourth film job is transferred to the film sheet, the **No More Film Jobs Available** dialog box appears.


No More Film Jobs Available
Your new patient will exceed the maximum number of film jobs.
You may expose or delete a film job or you may merge your current patient with one of the film jobs in the list.
Select a film job from the list
Init
Testpatient
Mustermann
Expose
Merge
Delete
Cancel
Help

This situation can generally only occur if the **Auto Expose** *option is deactivated for the film jobs. The film jobs then remain in the virtual film sheet until you send them to filming manually and thus complete them.*

You must first expose/print or delete one of the film jobs in the queue before a new film job can be accepted.

Exposing the selected film job

◆ Select one of the film jobs listed.

◆ Click **Expose**.
– The selected job is filmed and the new job is placed in its position in the virtual film sheet.

Deleting a selected film job

◆ Click **Delete**.
– The selected job is deleted and the new job is placed in its position.

Merging film jobs

◆ Click **Merge**.
– The images of the new film job are appended to the end of this old film job.

The film job remains in the virtual film sheet as a multiple film job until you transfer it to the camera or printer.
(→ Page 5)

Sending images to the camera/printer

Images can be transferred to the camera or printer via the same menu entries in the different task cards or in the **Patient Browser**.

Auto Expose

After a film job has been transferred completely to the virtual film sheet, it can immediately and automatically be transferred to the camera/printer.

Caution

The "Printed" flag is set as soon as the images have been successfully transferred to the printer control. Not all printers (e.g., paper printers) can solve printing problems themselves.

The image printout may be lost.

- Verify that the printouts are available before you delete images.

Auto Expose on

- Select **Options > Auto Expose** on the right monitor.

Or

- Click the **Auto Expose** button.
  - A film sheet that is completely filled is automatically printed or exposed as soon as an image for the next (empty) film sheet is transferred.

If the last film sheet is only partially filled, it depends on the configuration when it is sent to filming.
(→ Page 54)

Auto Expose off

- Deselect **Options > Auto Expose**.

Or

- Click the active **Auto Expose** button.

Aborting Auto Expose

If errors occur during automatic exposure, or you notice that faulty images have been filmed/printed, you can abort automatic exposure at any time.

- Deselect **Options > Auto Expose** on the right monitor.
- Eliminate the fault.

— Or —

- Delete the faulty images from the virtual film sheet.
- Activate **Auto Expose** again.

— Or —

- Transfer the remaining sheets to the camera/printer manually.

Transferring images manually

If the **Auto Expose** option is deactivated, all images to be filmed are collected in the virtual film sheet as film jobs. You decide which jobs are filmed or printed at what time.

Caution

The "Printed" flag is set as soon as the images have been successfully transferred to the printer control. Not all printers (e.g., paper printers) can solve printing problems themselves.

The image printout may be lost.

- Verify that the printouts are available before you delete images.

Exposing the current film task

- Select **Filming > Expose Film Task**.
  – All images of this film job are transferred to the camera or printer.

Or

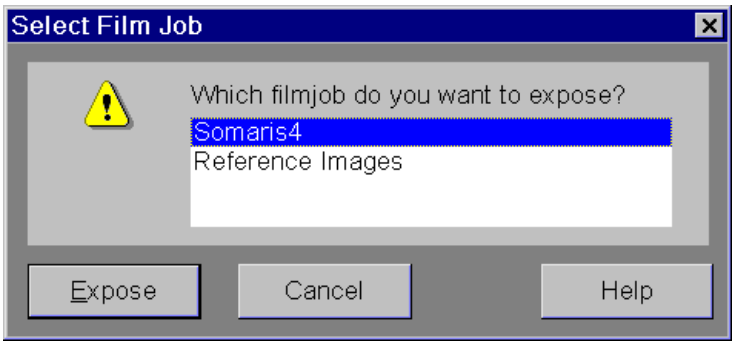
- Click the **Expose Film Task** button.
  – All images of the film job are transferred to the camera.

If you only want to expose a single film sheet instead of a whole film job, select the required sheet in the Filming task card or in the **Film Preview** *window and expose it from there.*
(→ Page 19)

Selecting a film job

If you have loaded several patients into the **Filming** task card, you can select the task you want to expose from the list displayed in the **Select Film Job** dialog.

◆ Select **Patient > Expose Film Task**.
– The **Select Film Job** dialog box is opened.

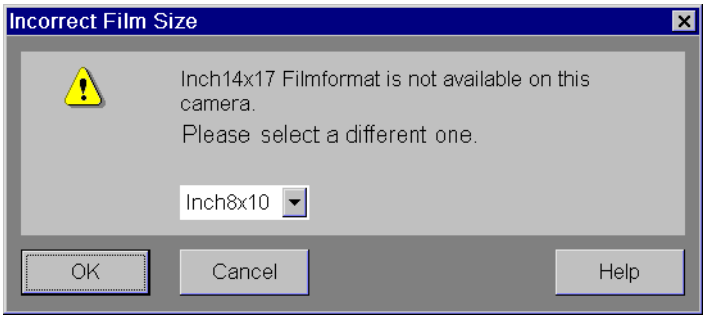


◆ Select a job.

◆ Click **Expose**.

Correcting the film size

If the film size set for the film sheet waiting to be exposed/printed is not supported by the selected camera, the **Incorrect Film Size** dialog box is displayed.



Selecting a different size

◆ Select the film size configured for the camera/printer from the selection list.

◆ Confirm by clicking **OK**.
– Filming/printing is resumed.

Viewing and processing film sheets and images

Once you have deactivated the **Auto Expose** option during manual filming, you can view and process the film sheets again before finally printing them or exposing them on film.

Film preview

If you want to obtain a quick overview of the film jobs in the queue that have not yet been sent to the camera or printer, you can use the **Film Preview** window.

Filming task card

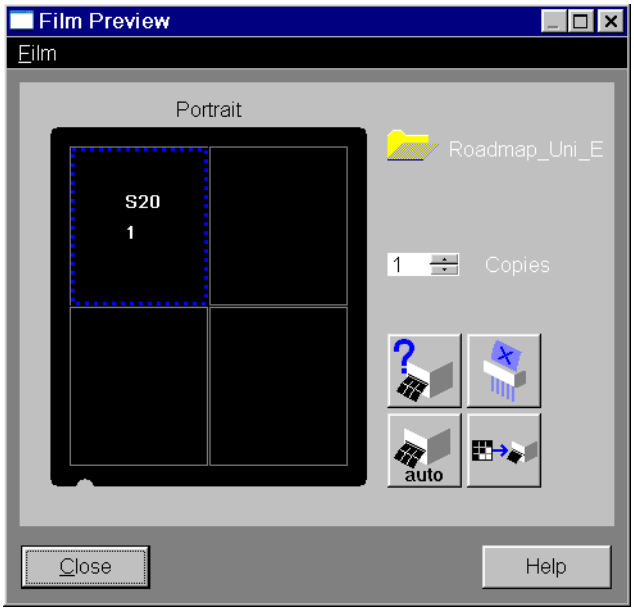
If you want to organize individual film sheets of the jobs in the queue more efficiently and clearly or if you want to process the images again before filming, switch to the **Filming** task card.

Film preview

In the **Film Preview** window, you can also access some basic functions for filming without having to switch to the **Filming** task card.

Calling up the film preview

- Select **Patient > Film Preview** in the **Patient Browser**.
  – The **Film Preview** window is displayed.



Basic functions

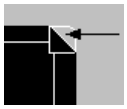
After you have called up **Film Preview**, the window will appear in front of the application you are currently working with.

Viewing film jobs

- Click on a film job.
  – The film job is opened.

Scrolling through the display area

Using the dog ears in the top right hand corner, you can page through all the film sheets of the film job.



- Click once on the outer triangle.
  – The film sheet is paged forward.

Or

- Click once on the inner triangle (dog ear).
  – The film sheet is paged backward.

Film task status

- Click the **Film Task Status** button.

Or

- Select **Patient > Film Task Status**.
  – The **Film Task Status** dialog box is displayed.

Selecting Auto Expose

- Click the **Auto Expose** button.

Or

- Select **Options > Auto Expose**.
  – The opened film job is automatically exposed.

Exposing a film job

Caution

Using paper printouts for diagnosing AX, CT and MR images.

Wrong diagnosis possible.

- Only use film material and cameras/printers suitable for diagnostic purposes.

- Click the **Expose Film Task** button.

Or

- Select **Patient > Expose Film Task**.
  – The opened film job is transferred to a camera/printer.

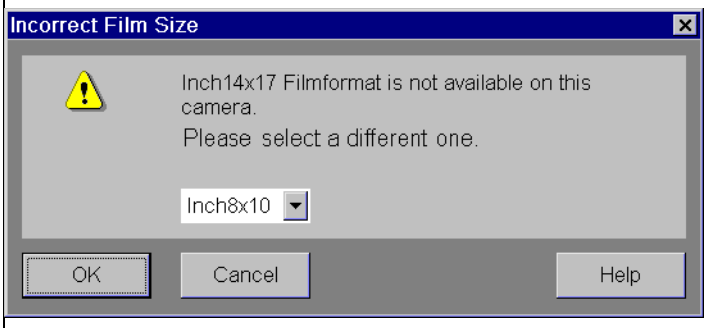
Exposing/printing a film sheet

Instead of a whole film job you can also transfer single film sheets to the camera or printer.

- Select a film sheet.
- Select **Filming > Expose Film Sheet**.
  – Only the selected film sheet is processed.

Incorrect film size

If the film size set for the film sheet waiting to be exposed/printed is not supported by the selected camera, the **Incorrect Film Size** *dialog box is displayed.*



- Select the film size configured for the camera/printer from the selection list.
- Confirm by clicking **OK**.
  – Filming is resumed.

Changing default settings

By default a layout has already been defined for every film job in the virtual film sheet and a camera or printer has been selected.

You can change these default settings in the **Film Preview** dialog box or in the **Filming** task card itself.

Selecting a camera or printer

- Select **Filming > Change Camera...**.
  – A dialog box is opened in which you can select a new camera/printer.

Note that you can only print on the paper/film size that was configured for the respective output device.

Changing film settings

- Click in a segment or on the border of the film sheet.

— Or —

- Select the film job.
- Select **Filming > Properties...**.
  – The **Film Properties** dialog box is opened in which you can change a number of layout settings for filming.

Or

- Right-click in a segment or on the border of the film sheet.
- Select **Properties** from the context menu.
  – The **Film Properties** dialog box is opened in which you can change a number of layout settings for filming.

The **No text** *option should not be used since otherwise image text and the patient name will not be visible on the film sheet. This can easily lead to confusions.*

Processing a film sheet

The **Film Preview** dialog offers a number of functions for reorganizing film sheets.

Deleting images

- Click the delete button in the control area.
  – The selected image is deleted. The following images move up so that no empty segments remain.

Or

- Select **Filming > Clear Document(s)**.
  – The image is deleted. The following images do not move up.
- Enter **Filming > Repack**.
  – Your film material is now used more efficiently.

Adding images

If you have opened the **Film Preview** from the **Patient Browser** window, you can add further images to a film job.

- Select **Filming > New Film Sheet**.
  – An empty film sheet is added to the end of the film job.
- Select **Patient > Copy to Film Sheet**.
  – These images are also appended to the end of the film job.

Processing film jobs and film sheets

In addition to the simple processing steps in the **Film Preview** dialog, you can also make complex and extensive changes to film jobs in the **Filming** card.

Calling up the Filming task card

The **Filming** task card is in the stack of task cards on the right-hand monitor.

- Click the **Filming** tab.

Or

- Maximize the **Film Preview** window.
  – The **Filming** task card is placed in the foreground.

Selecting a film job

By the patient folders in the upper part of the control area you can see which film jobs are currently waiting to be transferred to a camera/printer.

Designations

These jobs have one of the following designations:

- ❏ Patient name
  A film job that contains the images of a patient.
- ❏ Multiple
  A film job that contains the images of several patients.

If there is no film job in the virtual film sheet, a patient folder labeled **New** *is displayed.*

Opening a film job

- ◆ Click on a film job.
  – The film job is opened.

The patient folder opens up and the color of the folder remains unchanged.

Selecting an entire film job

- ◆ Click again on the opened film job.
  – All the film sheets with all images of this job are selected.

The folder icon is now highlighted (blue), and all the images of this job are shown in the film sheet display with a clear border and are therefore selected.

Setting multiple printout

- ◆ Select the number of copies with the spin buttons.

Or

- ◆ Enter the required number of copies using the keyboard.

Selecting film sheets and images

After you have opened a film job, its images are displayed in the left-hand part of the **Filming** task card.

Paging through several film sheets

◆ Page through the film sheets using the dog ears.

Or

◆ Double-click on the number of the current film sheet.
– The display field becomes an input field.

◆ Overwrite the number displayed with the number of the sheet that you want to go to.

◆ Press the **Enter** key.
– The film sheet you have entered is displayed.

Selecting a film sheet

◆ Click on the border of the film sheet.
– All the segments of the film sheet are now shown with a clear border.

Deselecting a film sheet

◆ Click outside the film sheet with the left mouse button.

Or

◆ Select a single image, another film sheet or another film job.
– Your selection is canceled.

Selecting multiple selection

You can also select more than one film sheet at once.

◆ Click on the border of the first film sheet of your choice holding the **Ctrl** key down.

◆ Page to another film sheet.

◆ Hold the **Ctrl** key pressed to extend your selection by a single film sheet.

Or

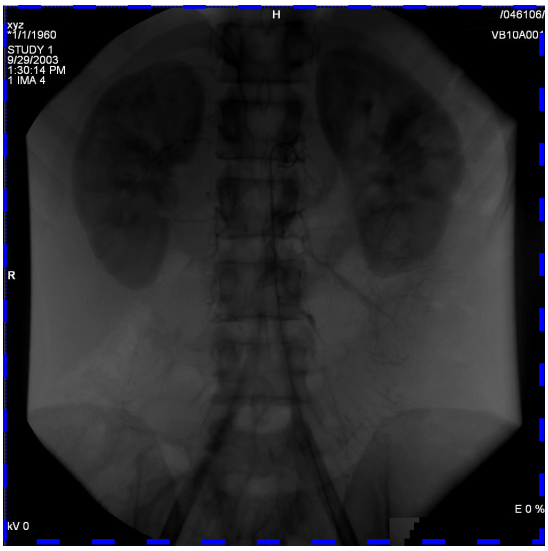
◆ Hold the **Shift** key pressed to select all the film sheets between the two film sheets including all their images.

When you have selected a film sheet, all images have a line border.

Selecting segments

You cannot only select whole film sheets, but also individual images of a film job.

The **Input Focus** *shows the active segment of the image area. It is marked by a dashed border and shows you which image is currently being processed.*



- Click on another image with the left mouse button to place the input focus on another segment.

Or

- Move the input focus using the arrow keys on the keyboard.

Selecting one or more images explicitly

- Click into a segment holding the **Ctrl** key down.
  – The segment is marked with a line border.

Selecting images explicitly up to the end of a series

- Click on the image that you want to select explicitly holding the **Ctrl** key down or use the input focus.
- Select **Edit > Select On Succeeding**.
  – The selected image and all the following images are now selected.

Selecting a complete series explicitly

- Click on the image of the series that you want to select holding the **Ctrl** key down or use the input focus.
- Select **Edit > Select series**.
  – The whole series is now selected explicitly.

Deselecting images

- Hold the **Ctrl** button pressed.
- Click on an explicitly selected image again.

Or

- Select **Edit > Deselect All**.
  – All selected images are deselected.
  – After that, the default input focus is set automatically, i.e. the top left segment is the destination of the next action.

Reorganizing film sheets

Using the **Filming** task card, you can reorganize film jobs in such a way that only those images are exposed or printed that you require.

Deleting images or film sheets

- Select one or more images or film sheets or use the input focus.
- Select **Edit > Delete**.

Or

- Delete the images/film sheets with this button.

Or

- Select **Filming > Clear Document(s)**.
  – The images are deleted, the segments in the film job remain empty.

Filling empty segments

- Select **Filming > Repack**.
  – The gaps are filled.

Copying images or film sheets

- First select the images/film sheets that you want to copy.
- Select **Edit > Copy**.
- Select the image in front of which you want to insert the copies.
- Select **Edit > Paste** from the main menu.
  – All the copied images are inserted in front of the selected segment. The image of this segment is moved back in the film job.

Moving images or film sheets

- Select the image or the images that you want to move.
- Select **Edit > Cut**.
- Select the segment in front of which you want to place the cut-out images.
- Select **Edit > Paste** from the main menu.

Appending a new film sheet

- Select **Filming > New Film Sheet** at any point in the film job.
  – A new (empty) film sheet is appended to the end of the film job.
- Then insert the copied or cut images into this sheet.

Editing images

In addition to the layout of film sheets, you can also change the display parameters of the images on the **Filming** task card to obtain an optimum output result. (→ Register Viewing, Page 35)

In the Filming task card, images are loaded with the window values with which they were last saved. If you have transferred images from the **Viewing** *task card, the images are displayed with the window values last used in the Viewing card.*

Windowing images

Using the **Window 1** and **Window 2** buttons, you can assign those window values that were permanently stored with the image data (e.g. with imported images). The images acquired at the system do not support different window values, the buttons are then inactive (dimmed).

◆ Select one or more images, or work in the input focus.

◆ Click **Window 1** or **Window 2**.
– The windows are assigned the values of the first or second stored window.

Zooming and panning images

◆ Click the **Zoom/Pan** button.

Or

◆ Select **Image > Zoom/Pan**.
– The function of the left mouse button is now switched from *Select* to *Zoom/Pan*. Now you can zoom the image and then pan it.

Restoring the zoom factor

◆ Select **Image > Home Zoom/Pan**.

Or

◆ Click the **Home Zoom/Pan** button.
– The images are assigned the zoom factor with which they were last stored in the database.

Changing the film settings for a film job

When your system is configured, a standard film layout is defined. This layout contains all the settings required for filming.

If these presettings are not suitable, you can change the following on the **Filming** task card or in the **Film Preview** dialog window:

- ❏ Select another camera or printer
- ❏ Change the number of copies
- ❏ Change the layout of the film sheets
- ❏ Change the image, text and graphic display

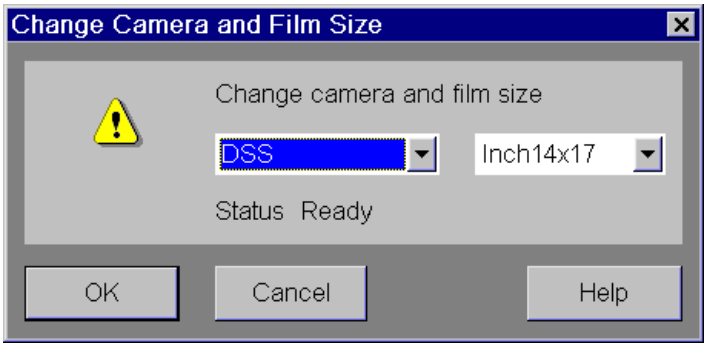
Selecting a camera and printer

If you do not want to expose or print your current film job with the default camera/printer, select another camera/printer for this job.

- Click the **Camera** subtask card on the **Filming** task card into the foreground.

— Or —

- Select **Filming > Change Camera...**.
  – The **Change Camera and Film Size** dialog box is displayed.



- Select a camera or printer from the list.
- Under **Film Size**, select the film size configured for the camera/printer.

The newly selected camera or printer is used as the default camera or printer. These are used whenever no other device is selected.

In the **Status** *display, you can see whether the selected camera/printer is switched on and available.*

Changing the layout of the film sheet

With the layout of the film sheet, you can define the size of each image.

Selecting images and film sheets

The film sheet layout is set for selected images of a film job.

- Select an entire film job.
  – The layout is changed for all sheets of this job.

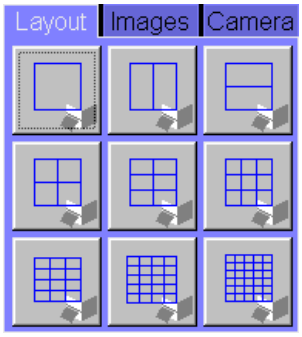
Or

- Select a film sheet.
  – The layout is changed for this single sheet only.

Or

- Select individual images, or work in the input focus.
  – The format for the concerned images is changed.

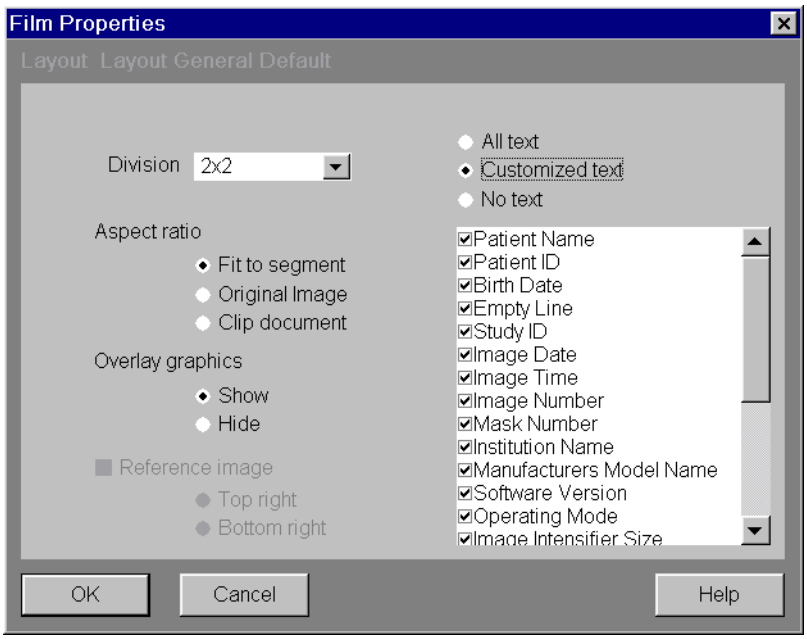
Changing the layout



- Click the **Layout** subtask card on the **Filming** task card into the foreground.
- Click the button for a film layout.
  – The selected images are displayed in this format.

Or

- Select **Filming > Properties...** in the main menu or **Properties** in the context menu (right mouse button).
  – The **Film Properties** dialog box is opened.

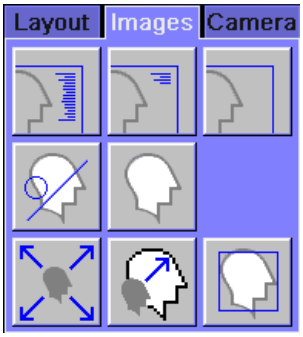


- Select a division in the **Division** selection list.

If the film sheet division is different for the selected images or film sheets, the **Division** *selection list is empty.*

Image, text and graphic display

The layout of the film sheet defines the number and size of the segments on a film sheet. In the **Film Preview** window and the **Filming** task card, you can change the aspect ratio of individual images in your segments and define whether and how text and graphics are to be printed or exposed on film.



- Click the **Images** subtask card into the foreground.

— Or —

- Call up the **Film Properties** dialog box.
  - The settings of the currently selected images are displayed.
  - The dots in the radio buttons are displayed gray if the settings of the images are different.

Changing the size of the segment

- Select an image, several images, or the entire film job.
- Click the **Fit to Segment** button.

Or

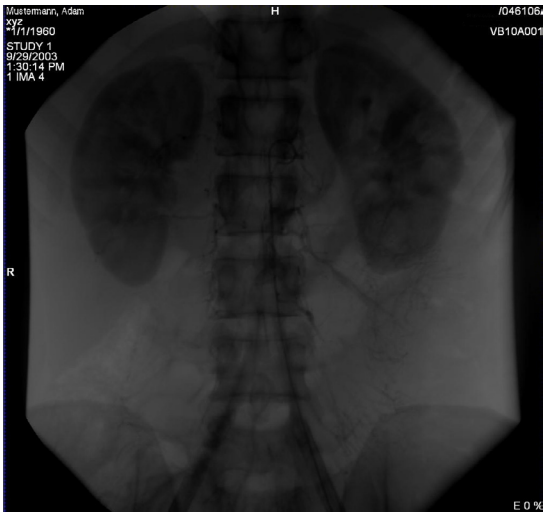
- Select **Fit to Segment** in the **Film Properties** dialog box.
  – The images are displayed as large as possible in the segment without any parts of the image being cut off.

Changing the image section

◆ Click the **Clip document** button.

Or

◆ Select **Clip document** in the **Film Properties** dialog box.
  – Rectangular images can be enlarged so that the shorter side of the image fills the segment. Parts of the longer side of the image are cut off (upper and lower edge of the image or the sides of the image).

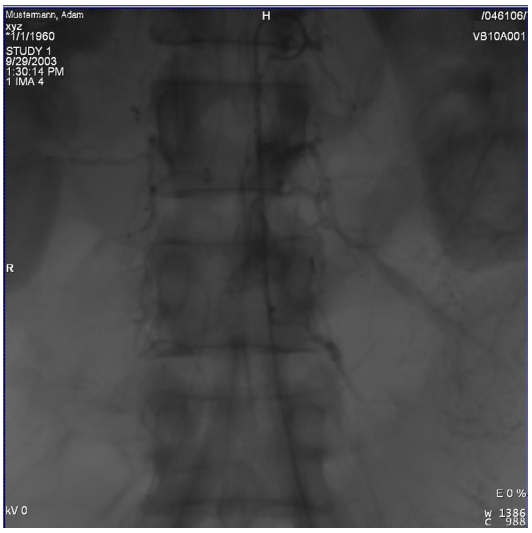


Setting the original image

◆ Click the **Original Image** button.

Or

◆ Select the **Original Image** option in the **Film Properties** dialog box.
  – The images are displayed in the segment in their original size (max. 1 % tolerance), the dimensions on the screen and on the printout are the original ones.



If it is not possible to display images in the **Original Image** *aspect ratio (1:1 scale), a message is displayed and the* **Fit to Segment** *option is selected instead.*

Showing/hiding text

In the film settings, you can select whether you want to have text information about the images printed/exposed on film.

Image texts and patient names should not be hidden. Otherwise, printed images can easily be mixed up.

- Click the **All text** button.

— Or —

- Select the **All text** option in the **Film Properties** dialog box.
  – All text information about the images is displayed in the segments and filmed or printed together with the images later on.

- Click the **No text** button.

— Or —

- Select the **No text** option in the **Film Properties** dialog box.
  – All text information in the segments is hidden.

- Click the **Customized text** button.

— Or —

- Select the **Customized text** option in the **Film Properties** dialog box.
  – Only part of the text information is displayed and exposed on film or printed.

In the **Film Properties** *dialog box, you can now select which text information is to be displayed if the* **Customized text** *option is selected.*

Displaying/hiding graphics and annotations

You can have graphics (e.g. ROIs) and annotations displayed or hidden.

- Click the **Show Graphics** button.

— Or —

- Select the **Active** option in the **Film Properties** dialog box.
  – The graphics (e.g. ROIs) and annotations are displayed.

- Click the **Hide Graphics** button.

— Or —

- Select the **Hide** option in the **Film Properties** dialog box.
  – The graphics (e.g. ROIs) and annotations are hidden.

Controlling data transfer

From the virtual film sheet the film jobs are transferred to the camera/printer. A queue of jobs waiting to be executed will be formed.

Display in the status bar

During the filming process, the status bar displays icons that tell you whether errors have occurred during the filming process.

Action	Symbol
Camera in operation	
Film exposure interrupted	
Output of warning messages	

The status of the printer is not shown in the status bar.

Viewing and manipulating film jobs

The **Film Task Status** dialog window contains detailed information about the filming process. You can stop the entire queue, trigger it again and repeat or delete individual film jobs.

Calling up the Film Task Status dialog

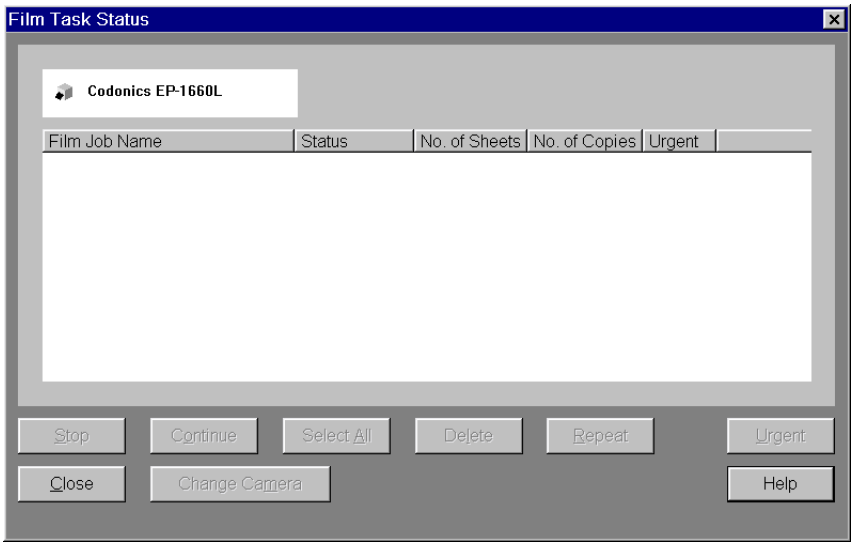
- Select **Patient > Film Task Status**.

Or

- Click the **Film Task Status** button.

Or

- Click an icon for local data transfer in the status bar.
  – The **Film Task Status** dialog box is displayed.



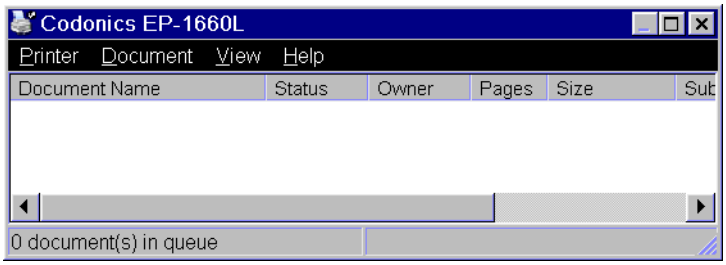
Displaying the queue for a camera

- Click one of the camera icons.
  – The queue of a camera is displayed.

The camera whose queue is being displayed is highlighted in a different color.

Displaying the queue of a printer

- Click one of the printer icons.
  – The print job control box is displayed. Here you can manipulate the print jobs for the selected printer by using the menu entries of the Windows XP operating system.



Manipulating film jobs

The status of a job determines how you can influence its execution and therefore what buttons are active.

Only film jobs sent to a camera can be modified in the **Film Task Status** *dialog box.*

Stopping jobs

You can stop jobs with the "Queued" or "Printing" status at any time, for example to insert a new film.

- Select one or more jobs having the "Queued" status.
- Click **Stop**.
  – All film jobs of this queue are stopped ("Stopped" status). In the job which is being exposed on film, a sheet that has been started will still be completed. All the following film sheets will not be processed.

Resuming jobs

Once your camera is ready again, you can resume execution of the queue.

- Select one or more jobs with the "Stopped" status.
- Click **Continue**.
  – All the jobs in the queue return to their original status. Film exposure is resumed. The job that was being exposed when you clicked **Stop** is resumed at the point at which you stopped the camera.

Repeating jobs

Film jobs that have been exposed and are therefore completed can be repeated while they are still in the queue.

- Select the required film job that has already been exposed on film and has the "Printed" status.

- Click **Repeat**.
  - The job is assigned the "Queued" status and is copied to the end of the queue.

Deleting jobs

You can delete film jobs that are listed in a queue regardless of their status.

- Select one or more jobs.

— Or —

- Click **Select All**.

- Click **Delete**.
  - The selected jobs are deleted.

If you delete a job that is being exposed, the sheet that has been started will still be completed, but none of the following sheets will be exposed on film.

Deleting the priority of film jobs

Film jobs that you want to process first can be classified as "urgent".

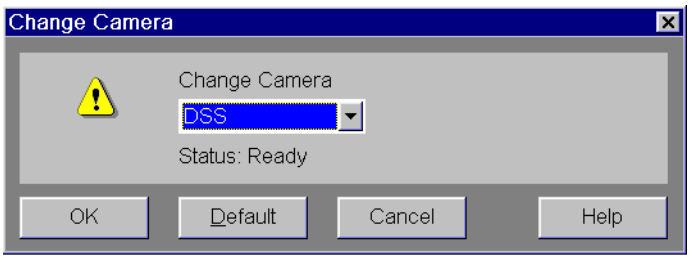
- Select one or more jobs with the "Queued" status.
- Click **Urgent**.
  – This job moves to the first position of all jobs with the "Queued" status.

If several jobs are classified as "urgent", they will be processed in the order listed.

Selecting another camera

You can select a new camera for one or more film jobs.

- Select one or more film jobs.
- Click the **Change Camera** button.
  – The **Change Camera** dialog window is opened.



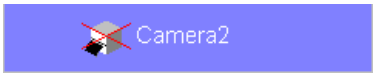
- Select a new camera from the selection list.

You cannot redirect film jobs with the "Printing" status, i.e. jobs that are being processed, to another camera.

Redirecting film jobs from a camera to a printer is not possible.

Redirecting jobs from an inaccessible camera

You can redirect the queue or even individual film jobs for a camera that is defective or switched off to another camera.



- Click the camera icon.
  – The queue of the camera is displayed.
- Click the **Change Camera** button.
  – The **Change Camera** dialog window is opened.

- Select a substitute camera from the selection list.
- Close the **Change Camera** box.
  – The queue of the camera is redirected to the substitute camera. The redirected queue is marked with the note "redirect" in the header of the dialog box.

Canceling camera redirection

- Click the camera icon with the note "redirect".
  – The redirected queue is displayed.
- Click **Change Camera**.
  – The **Change Camera** dialog window is opened.

- Click **Default**.
  – The queue is now assigned to the original camera again. The original device designation is again displayed in the header of the **Film Task Status** dialog box.

If you shut down the system before all the film jobs in a queue have been executed, the queue is not deleted. After rebooting the system, the film jobs are displayed in their old status again.

Configuration for filming/printing

You can adapt the filming and printing of images to your requirements in a flexible and individual way.

For this purpose two configuration windows for setting up the film function are available:

❏ In the **Filming Layout** configuration window, you can adapt the standard layout and create new layouts that are tailored to individual studies.

❏ In the **Filming Study Layout** configuration window, you can assign specific layouts to individual studies.

Calling up the configuration window

The configuration window is called up from the syngo **Configuration Panel**.

◆ Select **Options > Configuration** in the main menu.

Filming Layout

◆ Double-click the icon of the **Filming Layout** window.
– The **Filming Layout** window is displayed.

Or

Filming Study Layout

◆ Double-click the icon of the **Filming Study Layout** window.
– The **Filming Study Layout** window is displayed.

Configuring film layouts

You can change and create film layouts using the **Film Task** and the **Series** tab cards in the **Filming Layout** window.

Selecting a layout

In the **Filming Layout** configuration window, you can define the study-specific layouts.

In the **Layout name** selection list, you can specify which layout you want to change.

Defining a study-specific layout

During installation of your system, some study-specific layouts are also installed and assigned to individual studies or series.

This has the advantage that a suitable film layout is always used for these images.

You can adapt the default settings to your requirements by creating a new study-specific layout and assigning it to a study or changing an existing layout.

- Select the layout that you want to change.

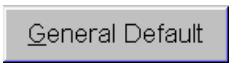
Or

- Enter a new name.
  – A new layout is generated.

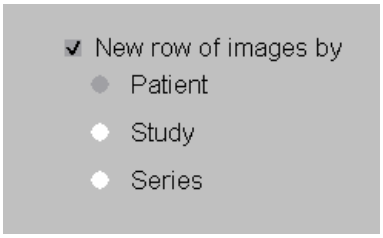
Your system can manage up to 100 layouts. If you attempt to create a 101st layout, an error message is displayed. You will then need to delete an existing layout.
(→ Page 60)

Changing the standard layout

When creating a new layout, you can base it on the settings of the standard layout in the **Film Task** or **Series** tab cards and change it to meet your requirements.

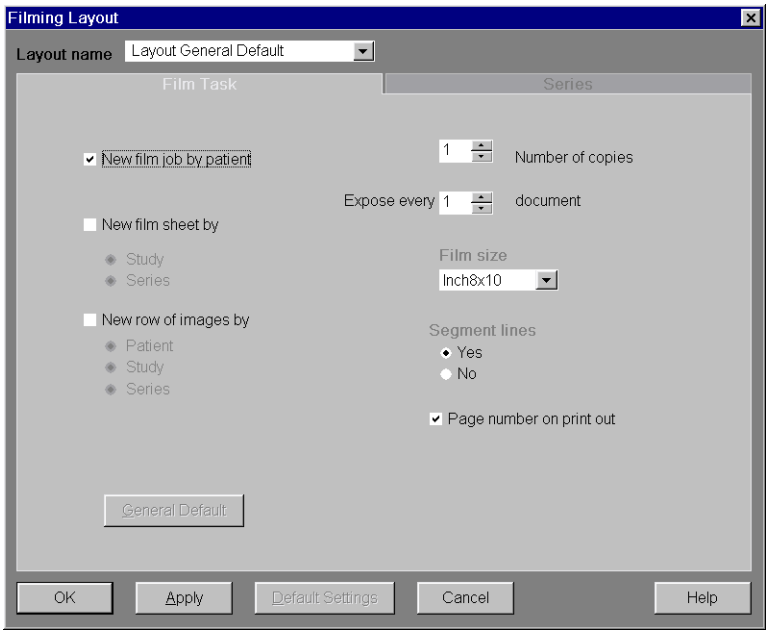


◆ Click the **General Default** button.
– The standard settings are entered in gray in the radio buttons and check boxes of the corresponding tab cards. Settings that you have changed are shown in black so that you can distinguish them from the default settings.



Configuring film job settings

On the **Film Task** tab card, you can define all the settings that determine the structure and execution of a film job.



Determining a film job

- Select the **New film job by patient** option.
  – A film job contains only the images of one patient.

Or

- Deselect the **New film job by patient** option.
  – Multiple film jobs are allowed.

Selecting a new film sheet

- Select the **New film sheet by** option.
  – Empty rows in film sheets are permitted.
- Select an option, e.g. **study**.
  – A new film sheet is started for each study.

Selecting a new row in the film sheet

- Select **New row of images by**.
  – Empty fields in film sheets are permitted.
- Select an option, e.g. **Series**.
  – A new row is started in the film sheet for each series.

Filming a partial selection

- Use the spin buttons to set whether every n-th image or all images (n = 1) of a film job are to be copied in the virtual film sheet and therefore exposed/printed.

Selecting the number of copies

- Define the number of copies.

Selecting a film size

- In the **Film size** selection list, select the film size configured for the camera/printer.

The entries offered depend on the cameras and printers.

Selecting segment lines

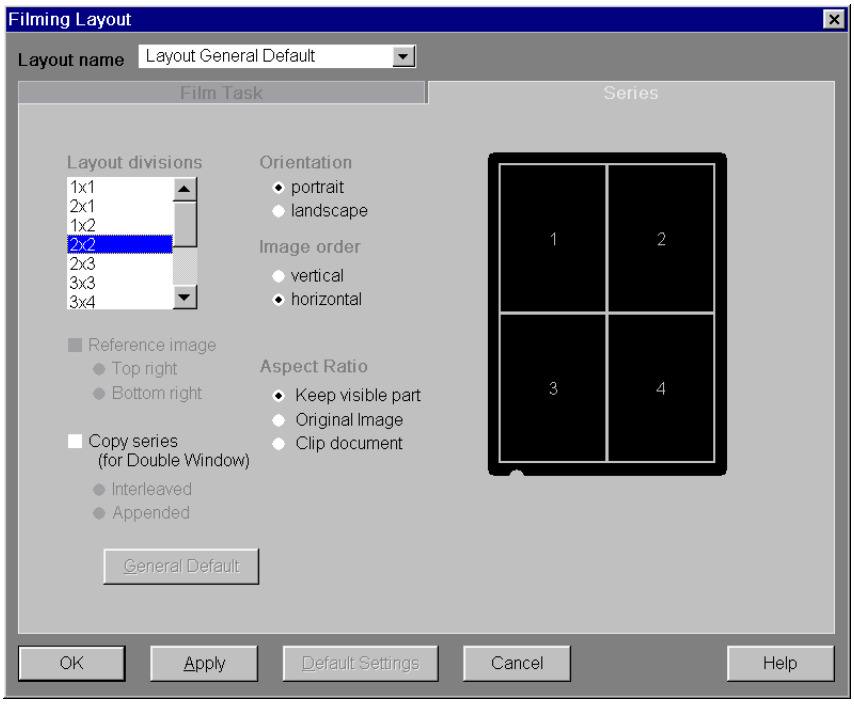
- Select the **Segment lines** option.
  – The images on the film sheets are separated by lines.

Printing page numbers

- Select **Page number on print out**.
  – Page numbers are added to the printout.

Configuring film sheets

On the **Series** tab card, you define the settings used for exposing or printing a film sheet.



Select the film sheet division

- In the **Layout divisions** selection list, you define the required number of columns and rows for a film sheet.
  – The division is shown in a diagram in the display window.

Selecting the orientation

- Select **portrait** for exposing on film/printing on paper.

Or

- Select **landscape** for exposing on film/printing on paper.

Selecting the image arrangement

- Activate the **vertical** option.
  – The images are arranged on the film sheet one after the other from top to bottom.

Or

- Activate the **horizontal** option.
  – The images are arranged one after the other from left to right.

Creating series with copy on film sheet

When transferring a series to the virtual film sheet, you can have a copy generated automatically and then process the copy before filming or printing.

- Click the **Copy series** option.
  – Copies of the series are generated.
- Activate the **Interleaved** option.
  – The copied series is inserted.

Or

- Activate the **Appended** option.
  – The copied series is appended to the end.

Selecting the display

- Activate the **Keep visible part** option.
  – The image is displayed in the segment with maximum size, without being cropped. This is the default.

Or

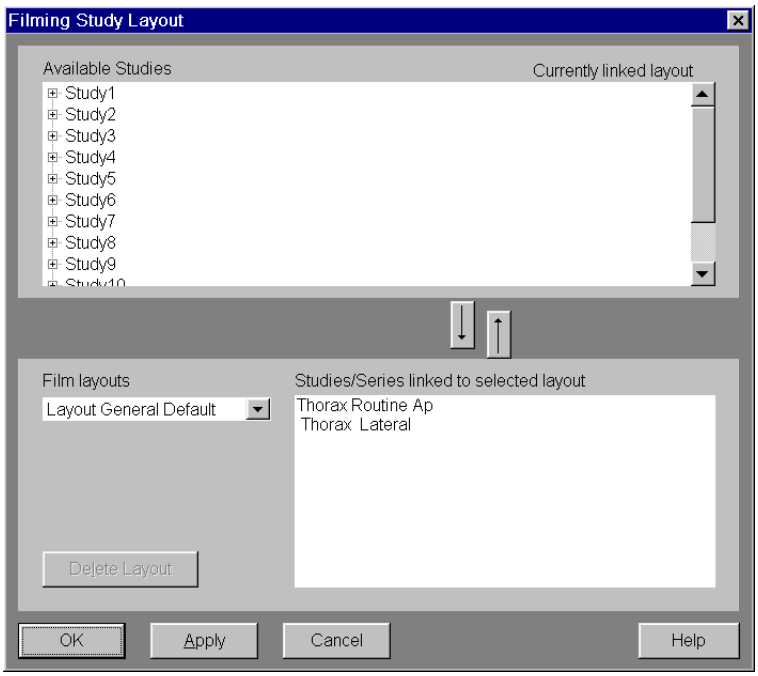
- Activate the **Original Image** option.
  – The image is displayed in its original size. Depending on the original size, the image might be cropped or displayed too small in the segment.

Or

- Activate the **Clip document** option.
  – The image is enlarged so that it fills the entire segment. The overlapping edges are cropped accordingly.

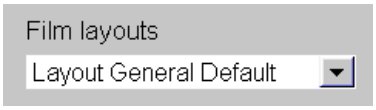
Linking layouts to a study or series

In the **Filming Study Layout** window, you can assign a specific layout to a study or series. This can either be a layout that you have created yourself or a layout that was created by Siemens Service during the configuration of your system.

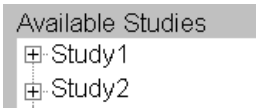


Assigning film layout

You can assign a layout by selecting a study or series stored in your system and the layout required and then linking the two.



- Select the required film layout.



- Click the + symbol in front of a study.
  – The associated series are displayed.
- Click a series or study.

- Click the **Down arrow** button.
  – The layout is assigned to the selected study or series.

Canceling a film layout assignment

If you want to assign a different study-specific film layout to a study or series, you must first cancel the old layout assignment.

- Select the relevant study or series in the **Studies/Series linked to selected layout** list.

- Click the **Up arrow** button.
  – The study/series is now assigned the standard layout again.

Deleting a layout

Since your system can store and manage up to 100 layouts, you should regularly delete those film layouts that you no longer require for the sake of clarity.

- Select a layout that you no longer require from the **Film layouts** selection list.

- Click the **Delete Layout** button.
  – The entry is deleted from the list.

You cannot delete the **standard layout**.

Introduction to archiving

After an examination or postprocessing, the images are stored in the local database.

This section explains how to save images and patient data from the local database and send them within the network, and how to export them to data media or through the network.

The hard disk of your imaging system (local database) is not suitable for long-term archiving of image and patient data.

Archiving data

Using the **Archive To...** function, you can save patient and examination data to an archive via a network.

You should archive patient and examination data routinely at regular intervals.

Exporting data

The **Export To...** function allows you to write data to a removable storage medium (CD-R) for short-term storage or transfer.

If your system is connected to a network, you can send patient and examination data to other workstations via the network using the **Send To....** function.

Importing data from archive media

If you need archived data again at a later date, you can reimport them with the **Patient Browser**.

Automatic data transfer

To make your workflow more efficient, you can also have your patient and examination data automatically written to data media that you have defined, or sent to specific addresses in the network.

You can define when and by what rules automatic data transfer is to take place.

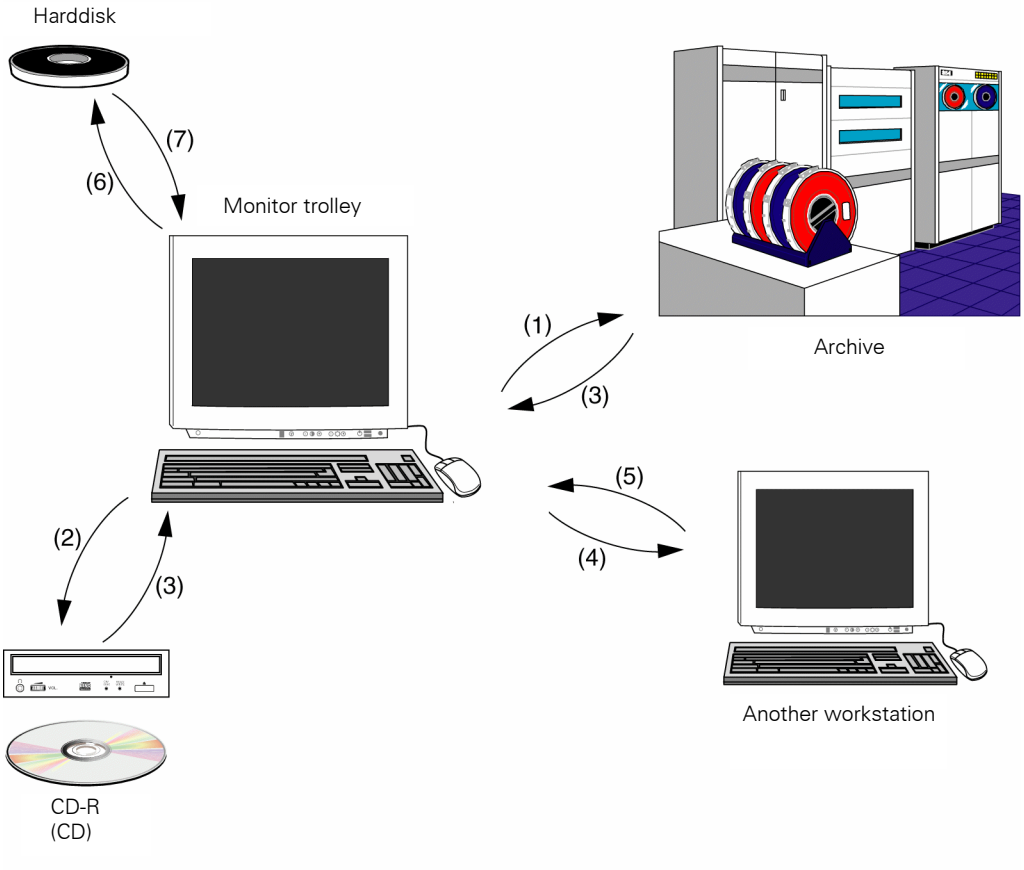
Import/export in the file system

If you want to process or use images with other programs, you can export them to a specific directory on the system hard disk in several image formats (DICOM, bitmap) (**Export To Off-line**).

In the same way, you can import images in DICOM format into your application (**Import From Off-line**).

Transfer options

The figure below shows the data backup and transfer options available to you.



(1) Storing to the archive (**Archive To...**)

(2) Exporting to CD-R (**Export To...**)

(3) Importing from a CD-R or archive

(4) Sending to other workstations (**Send To...**)

(5) Receiving from other workstations

(6) Exporting to a directory on the local hard disk (**Export To Off-line**)

(7) Importing from a directory on the local hard disk (**Import From Off-line**)

Please remember that not all transfer options may be available on your system. The devices and network nodes available depend on the individual configuration of your system and the options installed.

The hard disk of the imaging system is not suitable for long-term archiving of image or patient data.

Selecting data for transfer

Before starting data transfer, select the relevant data objects.

You can only archive, export, or send objects that are stored in the local database. If data are to be transferred from one data medium to another, they must first be imported into the main database.

Patient Browser If you want to archive or transfer patient or examination data, you usually select them from the local database of the **Patient Browser**.

Task cards You can also select individual objects on the task cards and then start transfer.

❑ **Viewing** task card

Calling up transfer functions

Archiving, data transfer within the network as well as export and import can be initiated either via a menu or by pressing buttons on the screen.

Transfer menu

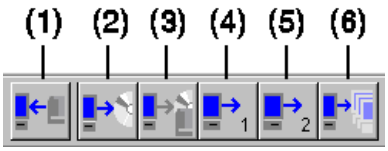
You can start archiving and data transfer from the **Transfer** menu on the **Viewing** task card and in the **Patient Browser** window.

Names such as **CD-R** *and* **Network/PACS** *are only examples of drive and network names. The names actually used depend on the configuration of your system.*

Buttons

Depending on your configuration, you will find different buttons for starting transfer quickly and easily in the control area of your task cards.

In addition, a number of icon buttons for transferring data can be found on the tool bar of the **Patient Browser**.



(1) Importing data

(2) Storing data to a specified default CD-R

(3) Storing data to a selectable local data medium (CD-R)

(4) Sending data to the first default network destination

(5) Sending data to the second default network destination

(6) Sending data to a selectable network destination

Key

You can also start transfer to the first default network destination with the **Send to default Node 1** key on the symbol keypad.

Archiving data

The menu item **Archive To...** is used to copy selected patient and examination data to archive media. For this, an archive server may be set up via the network. You can import archived data back to your local database whenever you need them.

General safety information

When archiving or sending data, an acknowledgement of receipt is sent from the destination address back to your computer ("Storage Commitment"). In the Patient Browser, this status is shown by flags for the relevant data objects.

The following "Storage Commitment" flags are used:

- **AC**
  Archived and committed
- **SC**
  Sent and committed

However, the flags do not confirm successful long-term archiving on the receiver side.

Caution

Misleading/misinterpretation of the AC/SC flags. The AC/SC flags indicate receipt and storage of data on hard disk on the receiver side.

Loss of data within the required period of retention

- Observe the regulatory requirements regarding the archiving procedure.

Caution

Damage or illegibility of CD-R media used for data storage.

Loss of data

- Local media should be configured and used as archive media only if the manufacturer has approved the media for archiving purposes.
- Check whether the data are legible before deleting them from the local database.

There are (statutory) regulations governing the archiving period, data availability, and data security (data integrity, incorruptibility), and recommendations concerning fire protection or water damage for the archiving of image data. The operator of the archive is responsible for observing these regulations.

Due to constant technical advancements, it may not be possible to implement storage and access for the required archiving period with a single storage technology and type of medium. Hence, migration of data may be necessary under the responsibility of the operator of the digital archive.

Archiving in the network (option)

If your system is connected to a central archive, use this to archive your patient and examination data (only with DICOM option).

The following information is of relevance for archive nodes:

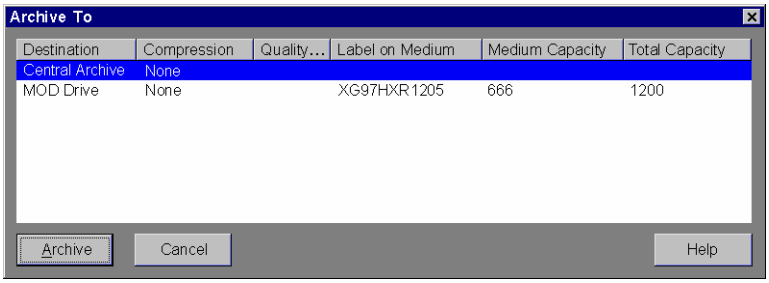
❏ **Destination**
Name of the archive

❏ **Compression**
Method by which data are compressed.

❏ **Quality Factor**
Quality factor with which data are compressed.

◆ Select the data that you want to archive.

◆ Select **Transfer > Archive To...**.
– The **Archive To** dialog box is displayed. The available archive nodes and drives are displayed.



◆ Select the required archive from the list.

◆ Click **Archive** to transfer the data to the selected archive.

Exporting data

Unlike the archiving function, the export function does not check for previous archiving processes, flags or the work status. In addition, data are not marked as archived, but only as exported.

General safety information

Caution

When you read data from a device and simultaneously export data to the same device, one job or both jobs can fail (depending on the timing).

Loss of data

- When exporting or storing data to a local storage medium (CD, MOD, DVD-RAM), do not try to read from the same medium in parallel, since this may stop the current export job and even damage the export medium. If you have stored data on the export medium in multi-session mode, these data may also become unreadable.

To minimize the risk of data loss, use only CD-Rs approved by Siemens. CD-Rs are available through your Siemens representative.

While data are being written to CD-R, the ARCADIS Orbic must not be shut down and the monitor trolley must not be disconnected from the C-arm system.

You cannot release radiation during the CD-R write process. It is recommended that you start the write process only when no examination is being performed.

Backup on local data media

Depending on the routine you use, one or several drives for external data media (CD-R) will be connected to your system.

In **Transfer Configuration***, you can define how the data of a patient are to be written to a medium (memory utilization and compression).*

Data medium

The system supports the following storage medium types:

- CD-R (CD Recordable)

Data are archived to a central archive via the network. The archive can use other data media.

Handling of data media

Please follow the relevant manufacturer's instructions when handling and storing CD-Rs.

Drives

Your system comes with a CD recorder for data storage.

Inserting and ejecting media

In order to export data, you must insert a suitable CD-R in the correct drive.

Inserting a CD

CDs can be written to on one side only.

- Press the eject button on the drive.
- Place the CD in the drawer with the label facing up.
- Press the eject button on the drive again.
  – The drawer with the CD is retracted.

Ejecting a CD

To eject a CD from the drive, always use the **Transfer** menu in order to avoid accidental interruption of the write process.

- Select **Transfer > Eject CD-RW**.
  – The drawer with the CD is ejected.

Storing to multi-session CD-R

As your system is configured for multi session, you can store your data to new, unrecorded CD-Rs, or CD-Rs that have already been written to once or several times. The other data on the CD-R are not lost, the new data are simply added.

DICOM Viewer In the first session, a DICOM viewer is written to the CD together with the image data. This allows you to view the images stored on the CD on any computer. The DICOM viewer is started directly from the CD; no files are installed on the computer.

Selecting data You will normally export the data to CD-R from the **Patient Browser** where you can simply select the required data objects.

Caution

Write error during the recording of additional sessions on the medium in multi-session mode.

Previously stored data and data of the current session can no longer be read.

- Do not delete the data stored on a medium from the local database until you have successfully finalized the medium and verified the legibility of the data.
- Please note that CD-Rs are not suitable for long-term archiving.

- Make sure that the correct CD-R is in the CD recorder.
- Open the **Patient Browser**.
- Select the patient, study, series or images you want to store on CD-R in the navigation or content area.

Writing data to a CD-R

◆ Select **Transfer > Export To ...** in the menu.

– Or –

◆ Click this button.
  – The selected data are written to CD-R.
  – The CD is automatically labeled with the date and time.

If the patient data are not yet complete, a corresponding message is displayed. Enter the missing data in the **Correct** *dialog box.*

Insufficient memory available

If the memory capacity of the CD-R is not sufficient, the message **Not enough space on CD medium** *is displayed.*

If you want to change the CD-R (for example, to insert a new, unrecorded CD-R), click **Eject**.

Sending patient data in the network (option)

If your system is connected to and configured in a network, you can select patient and examination data from your local database and send them to other users in your DICOM network whenever necessary.

Sending data to a standard address

During installation, Siemens Service can configure various network nodes (e.g. **Node 1** and **Node 2**) as standard addresses in the network.

- Select the data that you want to send.
- Press the **Send to Node 1** key on the symbol keypad.

Or

- Select **Transfer > Send to Node 1** or **Transfer > Send to Node 2**.

— Or —

- Click the relevant button.
  – The data are sent to the selected address.

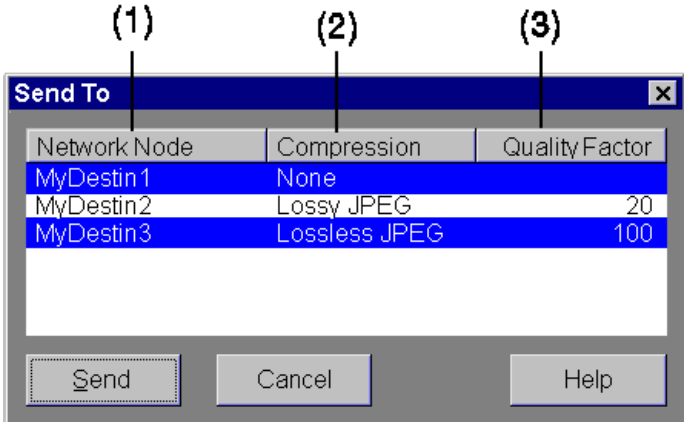
Sending data to other addresses in the network

If you want to send data to addresses other than the standard addresses or to more than one user in the network simultaneously, select the network node(s) from a list.

- First select the data that you want to send.
- Select **Transfer > Send To...**.

— Or —

- Click this button.
  - The **Send To** dialog box is displayed with a list of all available network addresses.



(1) Network Nodes
- Name of the network node (receiver name).

(2) Compression
- Compression method by which the data are prepared for faster transfer.

(3) Quality Factor
- The quality factor states the image quality of the compressed data compared with the original data.

- Select one or more network nodes.

- Click **Send**.
  - The selected data are sent to the required address(es).

Import/export in the file system

If you want to use and process images on other systems, too, you can copy them from the local database to a directory on your hard disk or on a remote computer, and import them from there.

Image formats

The following formats are supported for exporting:

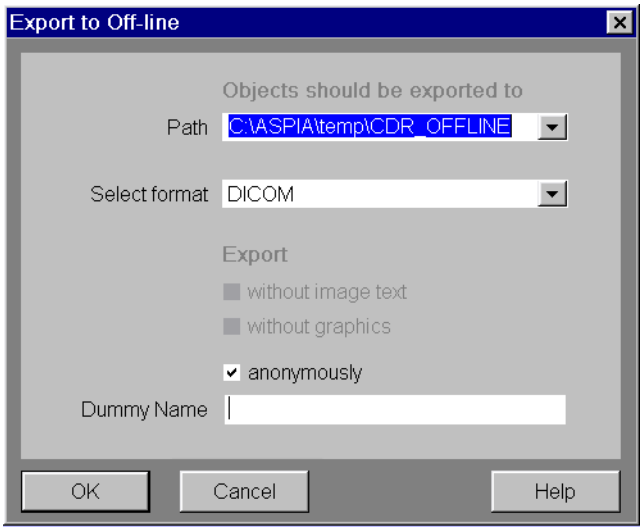
- ❏ DICOM format (*.ima)
- ❏ Windows Bitmap (*.bmp)

Importing images is only possible in DICOM format, not in Windows Bitmap or AVI format.

Exporting images to the file system

Calling up the export dialog

- Select the required images.
- Select **Transfer > Export to Off-line**.
  – The **Export To Off-line** dialog box is displayed.



Selecting the path

- Select the required drive and directory from the **Path** selection list.
- Extend the path, if necessary.

To select or create a subdirectory, add the subdirectory path to the prompted path separated by "\" (up to 8 subdirectory levels are possible from the root directory).

You can also select a directory on another computer in the network. In this case, you must enter the path as "\\computer_name\directory".

Please make sure that the names of new directories and subdirectories do not contain blanks.

*Do not use any of the following characters: ^ = *

Selecting an image format

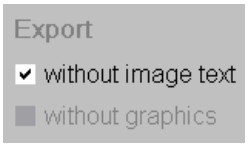
◆ Select the required image format in the **Select format** list.

Depending on the image type in question, images are exported with 8 bit/256 gray scales or 24 bit/RGB.

If you have selected a multiframe image in the **Patient Browser***, only the representative image in bitmap format is exported. In the Viewing task card you can select the individual images explicitly.*

Be aware that files in the C:\Temp\CDR_OFFLINE directory that exceed the CD-R's capacity are deleted when the **Record Off-line Files** *function is activated.*

Selecting image text/ graphic



◆ Check the corresponding check box.
– The image text and the graphic are "burnt into" the image and exported with it.

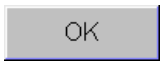
If you have selected DICOM format, the image text and the graphic is also exported as it is included in DICOM format, i.e. export functions in the dialog window are disabled.

Exporting anonymously

◆ Click the **anonymously** check box.

◆ In the **Dummy Name** field, enter the name under which you want to store the data.

Starting export



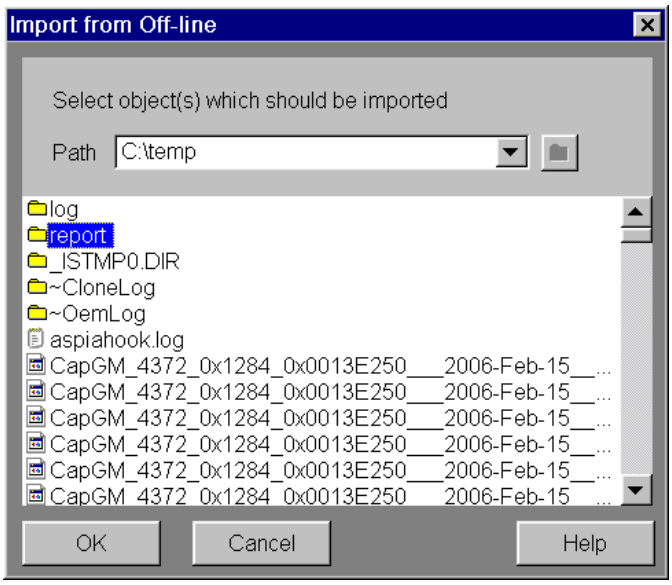
◆ Confirm by clicking **OK**.
– The selected image data are stored as individual files
– File names follow the following scheme:
Last name of the patient.modality.study description.series number.image number.timestamp.internal number.image format
– The timestamp has the following format: yyyy.MM.DD.hh.mm.ss.dddddd

Importing images from the file system

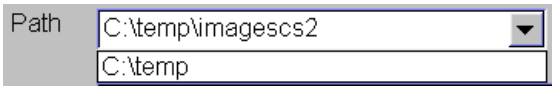
You can import individual images from specific released directories of the system hard disk or import them into your local database in the network.

Calling up the import dialog

◆ Select **Transfer > Import from Off-line**.
– The **Import From Off-line** dialog box is displayed.



Selecting files



◆ Select the required drive and directory from the **Path** selection list.

— Or —

◆ If necessary, navigate through the directory tree by double-clicking on a folder and using the "higher-level folder" button.

You can access all directories starting with the configured root directory.

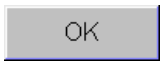
◆ Enter a file name.

You can specify several files at once using the wildcard "".*

Or

◆ Select the required file(s) from the directory.

You can select several files at once with the left mouse button using **Shift** *and* **Ctrl**.



◆ Confirm by clicking **OK**.

Or

◆ Double-click the relevant file.
– The selected image files are imported into your local database.

Recording off-line files onto CD

All images in bitmap format that were previously exported to a specific directory can automatically be recorded on CD-R. The path of this directory can be configured in service mode. The default setting for this path is C:\ASPIA\temp\CDR_OFFLINE.

Recording files

◆ Select **Transfer > Record Off-line Files** in the main menu.
– Recording is started in single session mode.

Note that the CD-R and the **Local Job Status** *clipboard must be empty. Recording can be started only after all jobs have been deleted from the clipboard.*

During the recording process it is not possible to copy files to the source directory.

Deleting files

◆ Once the recording process is completed, delete all files from this directory.

Controlling data transfer

All the jobs for archiving, sending or exporting data are queued and executed one after the other.

You can classify a job as urgent, stop jobs, repeat jobs or delete jobs to influence how the queue is executed.

Display in the status bar

During data transfer, icons are displayed in the status bar which tell you what operation is currently being executed and whether an error has occurred.

Action	Not active	Active	Error
Storing/exporting/ importing on data medium	no icon		
Sending/archiving/ receiving in the network	no icon		

If an error occurs during data transfer, an error message appears in the status bar together with the corresponding icon.

Viewing jobs

The **Local Job Status** dialog box informs you about storage jobs and the export and import of data to or from your CD-R drives.

In the **Network Job Status** dialog box, you can obtain information about jobs for data exchange through the network.

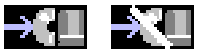
If your system is shut down during an archiving job, the number of remaining images displayed in the job status dialog boxes after a system restart may be incorrect.

Jobs with the status "Error", "Receiving" (or active import jobs), or "Spooling" are no longer displayed after a restart.

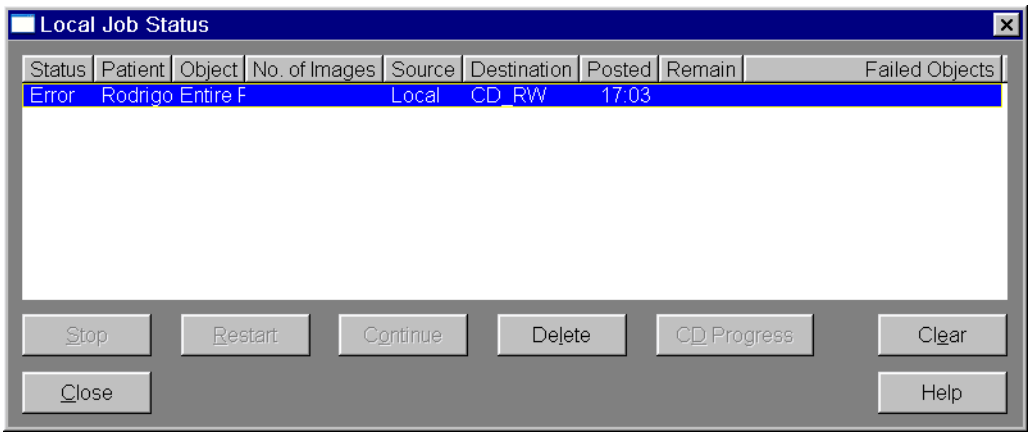
Calling up local jobs

- Select **Transfer > Local Job Status**.

Or



- Click on an icon for local data transfer in the status bar.
  – The **Local Job Status** dialog box is displayed.

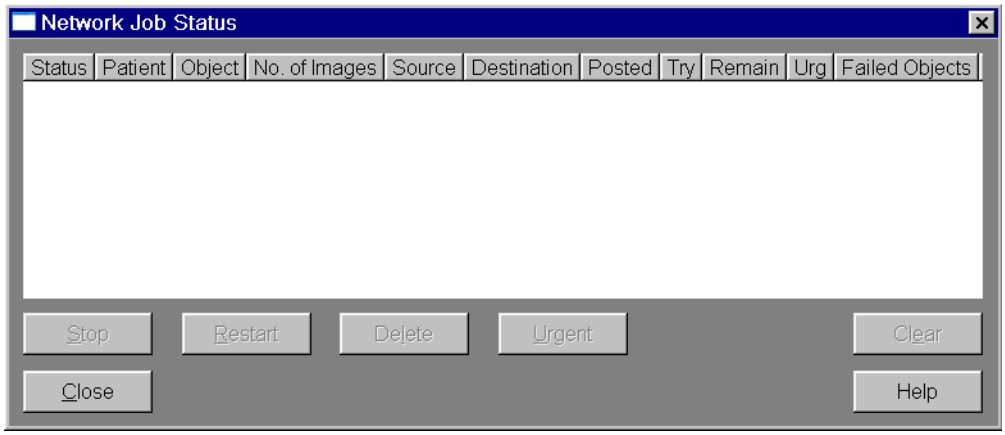


Calling up network jobs

- Select **Transfer > Network Job Status**.

Or

- Click on an icon in the status bar for data transfer via the network.
  – The **Network Job Status** dialog box is displayed.



Manipulating the execution of jobs

The steps that you can perform in the **Local Job Status...** and **Network Job Status...** dialog windows, and therefore the buttons that are active depend on the status of a job.

Stopping jobs

Jobs with the status "Active", "Retry" and "Queued" can be stopped at any time, for example, if you want to change the CD-R before processing the jobs.

- Select one or more jobs with the status "Queued".
- Click **Stop**.
  - The selected jobs and all other queued jobs with the same destination address are now no longer started automatically.

Resuming jobs

Jobs with "Stopped" or "Failed" status can be resumed at the point at which they were stopped (only for archive and import processes listed in the **Local Job Status** window).

- Select one or more jobs with "Stopped" or "Failed" status.
- Click **Continue**.
  - Jobs with the same destination address as the selected jobs are also resumed.

Restarting jobs

If you have stopped jobs or if errors occurred in jobs, you can start them again from the beginning. You can also repeat a job that has already been completed.

- Select one or more jobs with "Stopping", "Stopped", "Failed" or "Completed" status.

- Click **Restart**.
  – The jobs are restarted, their status is now "Active" or "Queued".

Deleting jobs

You can delete jobs that are listed in the job status windows, provided they do not have the status "Receiving", "Recording" or "Spooling".

- Select one or more jobs.
- Click **Delete**.
  – These jobs will no longer be executed and will be removed from the job list.

For technical reasons, large jobs will remain in the job list for a while with "Deleting" status even after they have been deleted. Do not restart or continue such jobs.

Changing the priority

Send jobs that are to be processed first are classified as "urgent" in the **Network Job Status** dialog box (no more than one job per destination address).

- Select a send job that is to be executed first.
- Click **Urgent**.
  – The send job in the queue is then started immediately after the active jobs.

Clearing a job list

Entries having the status "Completed", "Received", or "Error" can be removed from the job list.

- Click **Clear**.
  – The jobs are removed from the job list.

Configuration for archiving

In the **Transfer Configuration** window you can define how data are to be stored, exported and sent by your system.

Here you can make or change the following settings:

- ❏ Automatic storing and sending of examination data
- ❏ Compression of data during storing, export and sending
- ❏ Work status required for storing data and storage capacity on data media

Calling up the configuration window

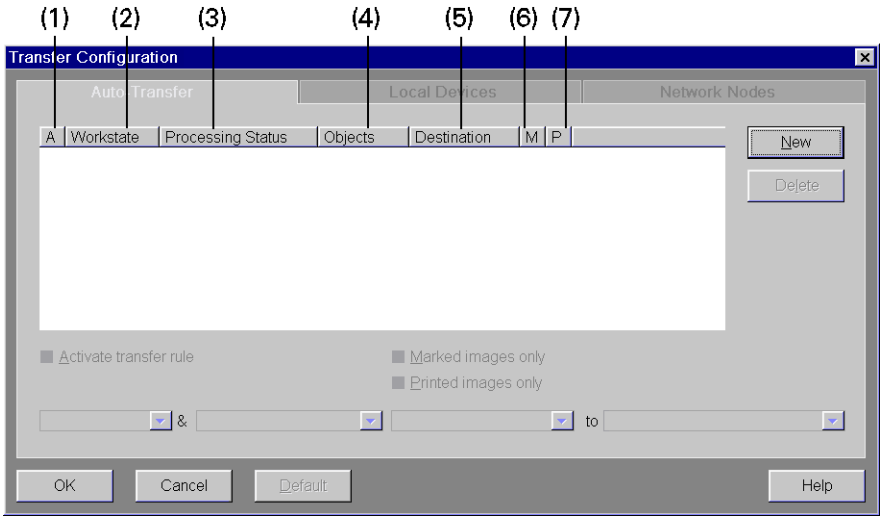
The configuration window is called up from the syngo **Configuration Panel**.

Transfer

- ◆ Select **Options > Configuration** in the main menu.
- ◆ Double-click the icon of the **Transfer Configuration** window.
  – The **Transfer Configuration** window is displayed with the **Auto Transfer**, **Local Devices** and **Network Nodes** tab cards.

Automatic data transfer

On the **Auto Transfer** tab card, you can define whether and by what rules patient and examination data are automatically stored or sent in the network.



(1) **Active**
A checkmark in the column indicates that this rule is currently being applied.

(2) **Work state**
The data selected for transfer that have reached the specified work status are automatically stored or sent in the network.

(3) **Processing status**
Data that have reached the specified status are automatically stored or sent via the network.

(4) **Objects**
Here you can see what type of data the rule refers to (i.e. images, series ...).

(5) **Destination**
In this column you can see which drive or network address the data are automatically transferred to.

(6) **Marked**
A checkmark in this column indicates that only marked data are automatically transferred.

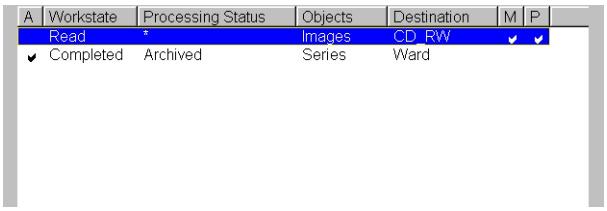
(7) **Printed**
A checkmark in this column indicates that only printed data are automatically transferred.

After an emergency registration, automatic data transfer is automatically deactivated (indicated in the status bar). After normal registration, automatic data transfer is reactivated.

Creating and editing rules

Underneath the list with existing rules for automatic data transfer, you will find input fields for editing the rules or creating new rules. You can create up to ten rules.

Selecting rules



- Select a rule for editing from the list.

Or

- Click **New** to create a new rule.

Creating rules

You can create a rule for automatic data transfer by combining attributes from the selection lists.

The selection list contains the following special entries:

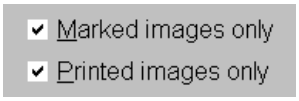
Selecting **None** *means that auto transfer will take place if the relevant attribute is empty.*

Selecting **Don't care** *means that the status is not relevant to the rule.*

*Selecting * means that any change to the corresponding attribute will initiate an automatic transfer.*

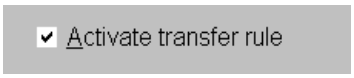
◆ Select the work status to be reached (max. 2), the data type and the destination address from the selection lists.

Automatic data transfer should always be configured at instance level.



◆ Check the **Marked** and **Printed** check box.
– Only marked and/or only filmed/printed images are used.

Activating rules



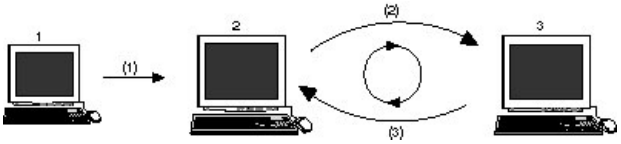
◆ Click the **Activate transfer rule** check box.
– The selected rule is active and used for starting automatic data transfer jobs.

Please note that you can also assign the "completed" status manually in the Patient Browser and thus initiate automatic data transfer, if necessary.

Infinite loops

Avoid infinite loops when creating rules!

Example of an unfortunate configuration with an endless loop:



(1) Computer 1 sends data to computer 2.

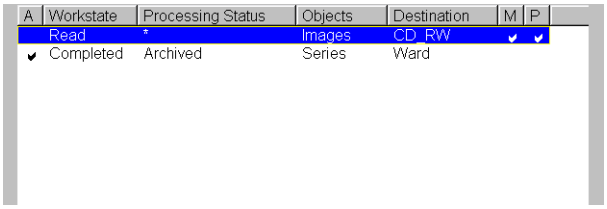
(2) Rule on computer 2: Send all data received to computer 3.

(3) Rule on computer 3: Send all data received to computer 2.

As soon as computer 2 receives data for the first time, these data are sent back and forth in a loop between computers 2 and 3.

Deleting rules

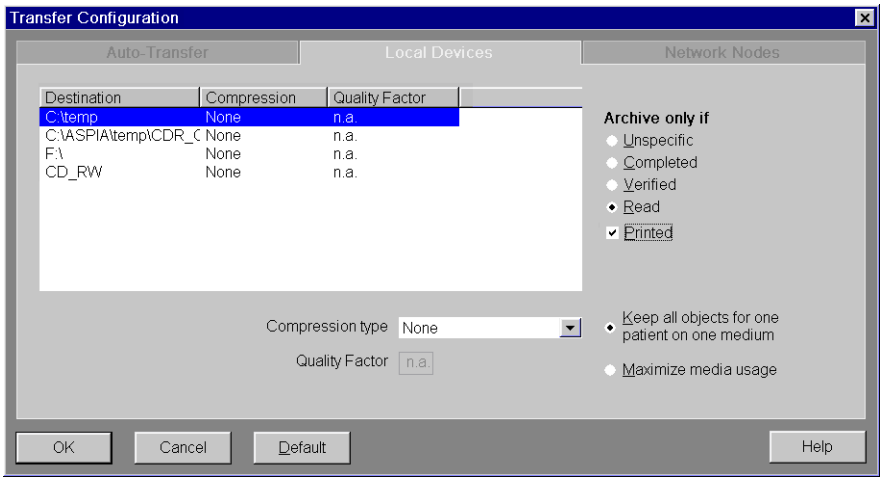
Rules that will not be needed again for automatic data transfer can be deleted instead of just deactivating them.



- Select the rule that you want to delete from the list.
- Click **Delete**.
  – The rule is removed from the list.

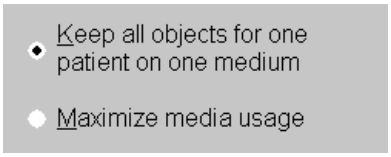
Local Devices

On the **Local Devices** tab card, you define the default settings for storing and exporting data on data media.



Defining the use of storage capacity

If you require more than one data medium for storing or exporting, you can define whether the data of one patient can be distributed over two data media or not (if possible).



- Click the **Keep all objects...** option.
  – The data of one patient are always stored contiguously on one data medium.

Or

- Click the **Maximize media usage** option.
  – The examination data of one patient are distributed over two or more data media. This will make optimum use of the storage capacity of the data media.

Keep all objects for one patient on one medium *only ever applies to one job.*

Setting data compression for storing

Patient and examination data can be stored or exported compressed or uncompressed.

Data that were compressed before transfer will use up less storage space and are transferred more quickly. When reimporting data into your local database, compressed data are automatically decompressed.

Images stored in your database by lossy compression can only be stored with the same quality factor.

Caution

The compression method is set to irreversible compression (Lossy JPEG).

Information of medical relevance may be lost.

- Do not use images stored by lossy compression for primary diagnosis, since their image quality may not be sufficient.

- Select a drive for which you want to define data compression.

- Under **Compression type**, select whether and how data are to be compressed.

- Under **Quality Factor** (1 - 100 %), specify the remaining image quality in % as compared with the original material.

The quality factor can be specified only in the **Lossy JPEG** *setting. Which quality factor is acceptable to you will depend on your requirements.*

JPEG compression is indicated in the image segment (it is not indicated if **No Text** *is selected).*

Defining the work status for storing

Here you can select the work status that patient and examination data must have reached before storing. If this work status is not reached, a warning will be displayed before data transfer starts.

- Use the radio buttons to define the work status required as a prerequisite for storing.

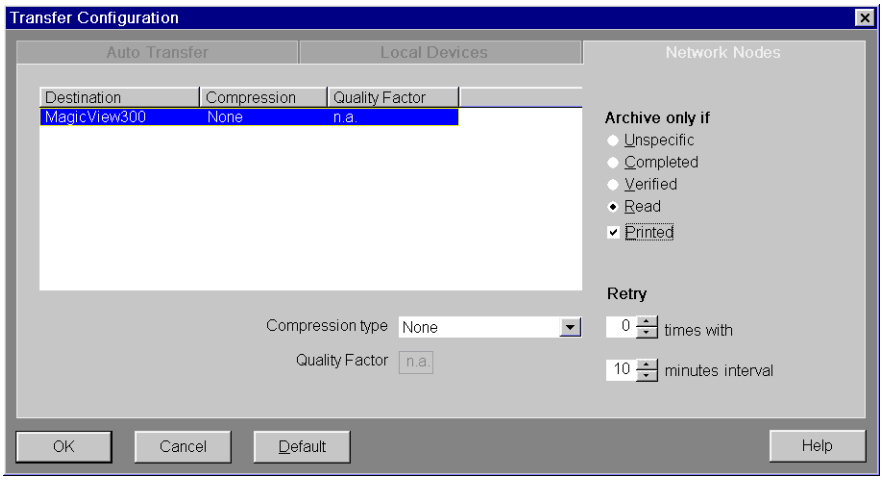
The **Verified** *and* **Read** *options apply to the study and series levels only.*

If you select the **Unspecific** *option, you can store data of any work status without confirmation.*

- Click the **Printed** check box, if necessary.
  – Images must have been printed/filmed at least once before they are stored.

Network nodes (option)

On the **Network Nodes** tab card, you can define the default settings for sending data in the network. For each network address you can specify the compression type and quality factor, if necessary, as well as rules for repeated send attempts and the work status.



Setting data compression for sending

Similar to storing or exporting data on external data media, you can activate data compression for sending patient and examination data through the network (depending on the configuration of your system).

Caution

The compression method is set to irreversible compression (Lossy JPEG).

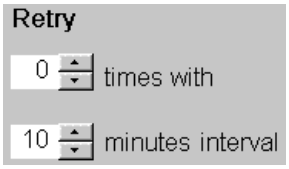
Information of medical relevance may be lost.

- Do not use images stored by lossy compression for primary diagnosis, since their image quality may not be sufficient.

- Specify the individual network addresses, the compression type and quality factor.
(→ Page 96)

Setting retries

If errors occur during data transmission in the network, they can often be remedied by a repeated attempt. You can set how many times and at what interval attempts are to be repeated.



- Enter the number of retries or click on the arrows. (Possible values: 0 to 5; default: 0)
- Enter the time interval between retries. (Possible values: 5 to 60 min; default: 10 min)
  – The number of retries is displayed in the **Network Job Status** dialog.

Defining the work status for sending

Here you can select the work status that patient and examination data must have reached before they can be sent. If this work status is not reached, a warning is displayed before sending.

- Click the relevant radio button to define the work status required for sending. (→ Page 97)

SIEMENS

Operator Manual
ARCADIS Orbic

Configuration

SP

SPR2-320.620.01.02.02

Please observe the

Safety register

This must be studied thoroughly before system startup.

The original version of this manual was written in the German language.

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Operator Manual
Configuration

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Examination configuration

It is generally not necessary to set examination parameters and thus configure exam sets, since the default standard programs delivered with the system already cover a large spectrum of dedicated applications.

If you wish to configure your own examination sets nevertheless, you can make the parameter settings in the **Examination Set Configuration** dialog window.

Basically there are two different configuration possibilities:

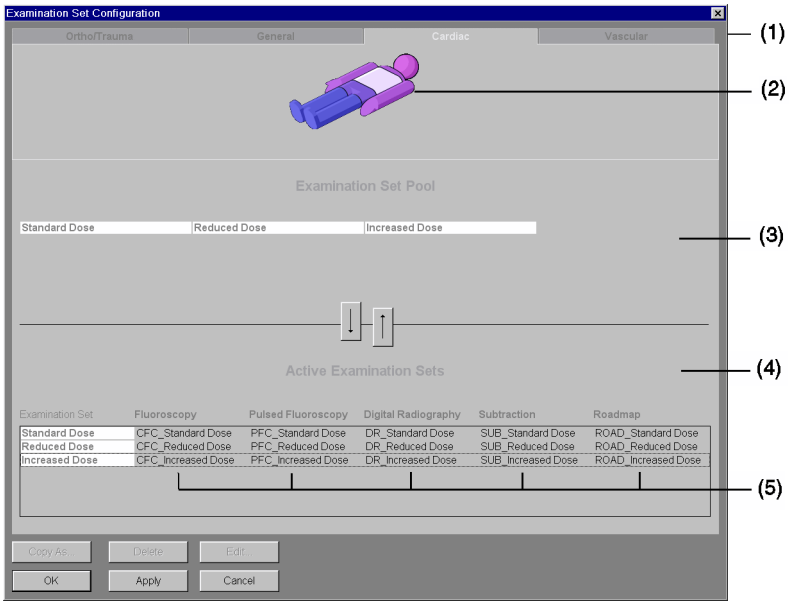
- Administration (activating, deactivating, creating and deleting) of *exam sets*. Thus you define the choice of exam sets that are available to you in the selection lists in the control area of the **Examination** task card.
  These settings are made directly in the **Examination Set Configuration** window.
- Modifying system-specific parameters of *operating programs*. Thus you can define in detail the acquisition parameters of the exam set to which the relevant operating program belongs.
  These settings are made in special tab cards that can be called up for the corresponding exam set from the **Examination Set Configuration** dialog.

Calling up/closing a configuration window

The configuration window is called up from the syngo **Configuration Panel**.

◆ Select **Options > Configuration** in the main menu.

◆ Double-click this button.
– The **Examination Set Configuration** window appears.



(1) Medical application field

(2) Virtual patient anatomy (VPA)

(3) Area of passive examination sets

(4) Area of active examination sets

(5) Operating programs with the parameter settings specific to the examination set in the individual operating modes

Applying changes

If you have changed the settings of the examination sets, you must confirm your entries.

◆ Click this button.
– Your changes are applied to the ARCADIS Orbic system.
– The configuration dialog remains open for further entries.

Or

◆ Click this button.
– Your changes are applied to the ARCADIS Orbic system.
– The configuration dialog is closed.
– The changes you made in the examination settings are automatically applied to the next examination.

Examination sets

The examination sets are assigned to medical application fields. Within each application they are also assigned to special body regions. You will find the same assignment pattern on the **Examination** task card.

Medical application fields can additionally be licensed by options. The medical application field 'Vascular', for instance, is tied to the 'DSA/Roadmap' option. If the option is not activated, the **Examination Set Configuration** *window will not contain a configuration card for this option, and the application field cannot be selected in the* **Examination** *task card.*

Selecting examination sets

To edit examination sets, first select the medical application field and then the body region.

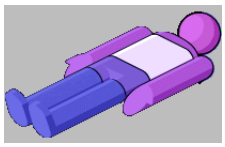
Selecting the medical application field

Each medical application field is represented by a tab card in the **Examination Set Configuration** dialog window.

- Click on the tab of the required medical application field.
  – The selected tab card is placed in the foreground.

Selecting body regions

Within a medical application field, the following body regions (and only these) can be selected: "Head", "Body trunk" (Thorax, Ventral Region, Cervical spine, Thoracic spine), "Pelvis" (Pelvis, Lumbar spine, Hip), "Upper extremities", "Lower extremities".



- Click the required body region in the "Virtual patient anatomy".
  - The activated body region is highlighted.
  - In the lower area of the **Examination Set Configuration** dialog window, the examination sets which are especially designated for this body region are displayed.

A medical application field does not necessarily contain examination sets for all indicated body regions. The assignment of body regions therefore depends on the medical application field.

Active/inactive examination sets

The examination sets are listed in the **Examination Set Pool** and **Active Examination Sets** areas.

Examination Set Pool

The area of available examination sets consists of all programmed examination sets that are stored in the ARCADIS Orbic system, but have not necessarily been activated.

Active examination sets

The area of active examination sets consists of all programmed examination sets stored in the ARCADIS Orbic system that have been activated. These are thus available in the selection list of examination sets in the **Examination** task card.

Activating exam sets

You can activate further examination sets by moving them from the selection pool to the active pool.

- Click an examination set in the **Examination Set Pool** area.

- Click this button.

Or

- Drag the examination set into the **Active Examination Sets** list using the mouse.

Changing the sequence

The sequence of examination sets in this list of active programs defines the sequence in which they appear in the selection list of the **Examination** task card. Therefore the most important and most frequently used programs should be at the top of the list.

- Drag the examination sets individually to the required position within the active pool.

A horizontal line represents the examination set that is currently being moved.

Deactivating exam sets

You can deactivate individual examination sets by moving them from the active to the passive pool.

- Click an examination set in the **Active Examination Sets** area.

- Click this button.

Or

- Drag the examination set into the **Examination Set Pool** list using the mouse.

At least one examination set must remain in the list of active examination sets. You cannot deactivate all examination sets.

User-defined examination sets

In the **Examination Set Configuration** dialog window, you can create your own examination sets with self-defined settings. In the **Examination** task card you can access these user-defined examination sets in the same way as the default standard examination sets.

User-defined examination sets are created on the basis of an existing examination set. You can adapt the system-specific parameters to your requirements by editing the individual operating programs assigned to the examination set.
(→ Page 12)

Creating exam sets

◆ Select your template from the active or selectable examination sets.

◆ Click this button.

— Or —

◆ Select **Copy as** in the context menu of the name entry for the examination set.
– The **Copy As** dialog box is opened.

◆ Enter a unique name for the new examination set.

◆ Click this button.
– The new examination set is created within the current medical application field and the selected body region and is added to the **Examination Set Pool**. If an active examination was selected as a template, the newly created examination set is also included in the list of active examination sets.

Renaming exam sets

- Double-click the name entry of the examination set you want to rename.

— Or —

- Select **Rename** in the context menu of the name entry.
  – A dialog window is displayed in which you can enter the text.
- Enter a suitable name for your examination set.
- Confirm with the **Enter** (Return) key of your keyboard.
  – The new name is accepted and is displayed in the examination set lists.

The standard examination sets delivered with the system cannot be renamed.

Deleting exam sets

- Select the examination set that you want to delete.

- Click this button.

— Or —

- Select **Delete** in the context menu of the name entry for the examination set.
  – A dialog window is displayed which prompts you to confirm deletion.

- Click this button.
  – The examination set is deleted from the examination set lists.

The standard examination sets delivered with the system cannot be deleted.

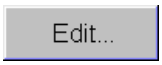
Editing exam sets

Examination parameters are changed by editing the corresponding operating programs. Operation program settings can be defined on separate tab cards which you can call up from the **Examination Set Configuration** window after selecting the examination set.

Changes to the parameters of an examination set should only be performed by experienced medical staff.

If the examination or operating parameters have been modified, a test pattern should be generated. In this way the new parameters can be verified.

- Select the examination set whose operating parameters you want to change.



- Click this button.

— Or —

- Select **Edit** in the context menu of the name entry for the examination set.
  – The **Operating Program Configuration** window appears. Here you can define all the parameter settings for the different operating programs of the selected examination set.
  (→ Page 12)

Operating programs

An examination set consists of a set of operating programs. Each of these programs defines the settings for X-ray generation and image acquisition for one single operating mode.

The operating programs are configured in the **Operating Program Configuration** dialog, which you have called up from the **Examination Set Configuration** dialog.

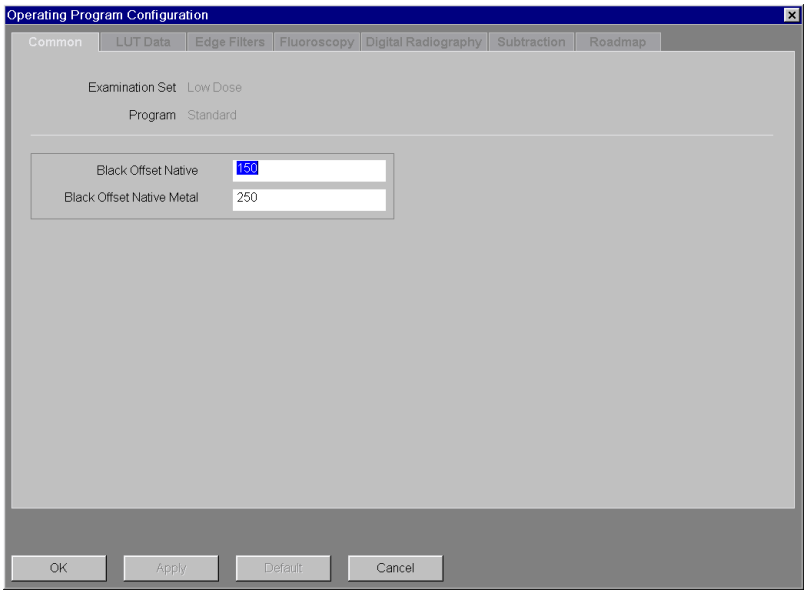
The Operating Program Configuration dialog contains a tab card (labeled correspondingly) for each supported operating mode. In the tab cards you can specify the parameters of the operating program in the respective operating mode. In addition, some parameters may be common to several operating modes of an examination set. They are available on other tab cards that are independent of the operating mode.

The parameters for the fluoroscopy, pulsed fluoroscopy and digital radiography modes are configured for every examination set. For the Subtraction option the parameters for the Subtraction and Roadmap modes are configured additionally. The parameters are individually adapted to each examination set.

There is a **Reset to Default** *button on every tab card. With this button you can reset the parameters back to the original state (parameter settings of the underlying operating program).*

The 'General' tab card

On this tab card you define the parameters that apply to all operating programs in each examination set.



Parameter settings

You can change the following parameters on the tab card:

Parameters	Additional info
Black Offset Native	possible values: 100 to 900
Black Offset Native Metal	possible values: 100 to 900

Changing parameters

◆ Select the required new parameters from the selection lists.

Apply

◆ Click this button.
– Your changes are applied to the ARCADIS Orbic system.
– The configuration dialog remains open for further entries.

◆ Continue configuring the next operating mode on the corresponding tab card.

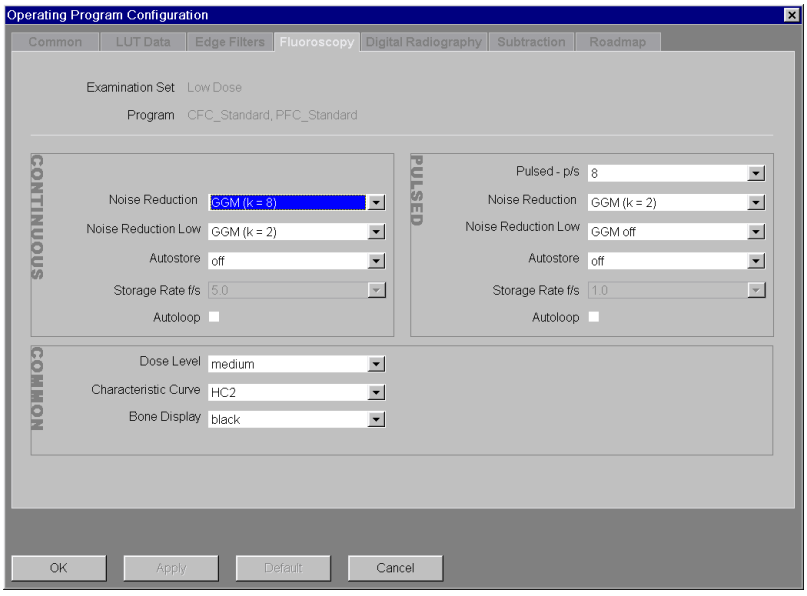
— Or —

OK

◆ Click this button.
– The dialog box is closed.

The Fluoroscopy tab card

The operating programs for continuous fluoro and pulsed fluoro are configured on the same tab card. There are some parameters that are specific to each of these operating programs (**CONTINUOUS** and **PULSED** areas), and some that are identical for both (**COMMON** area).



Parameter settings

You can change the following parameters on the tab card of the individual area:

Parameters	Additional info
Noise Reduction	Parameter sets for noise reduction and parameter sets for motion detection are possible
Noise Reduction Low	Noise Reduction Low is always less or equal to noise reduction
Autostore	Off (no automatic storage) Last (last image is stored) All (all images are stored)
Storage Rate f/s	Only if Autostore = all Setting in frames/s
Autoloop	Checkbox for activating automatic playback of a sequence of images at the end of the exposure
Pulsed p/s	Possible values for the storage rate depend on the set value
Dose Level	Possible values: low, medium, high
Characteristic Curve	Entries can be defined using the service user interface
Bone Display	Possible values: white, black

Changing parameters

◆ Select the required new parameters from the selection lists.

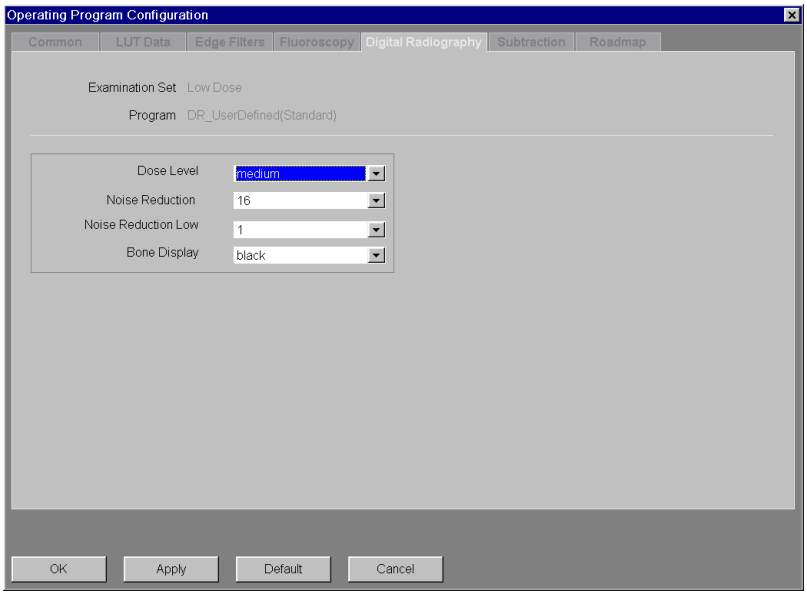
◆ Click this button.
– Your changes are applied to the ARCADIS Orbic system.
– The configuration dialog remains open for further entries.

◆ Continue configuring the next operating mode on the corresponding tab card.

— Or —

◆ Click this button.
– The dialog box is closed

The Digital Radiography tab card



Parameter settings

You can change the following parameters on the tab card:

Parameters	Additional info
Dose Level	Possible values: medium, high
Noise Reduction	Parameter sets for noise reduction and parameter sets for motion detection are possible
Noise Reduction Low	Noise Reduction Low is always less or equal to noise reduction
Bone Display	Possible values: white, black

Changing parameters

◆ Select the required new parameters from the selection lists.

Apply

◆ Click this button.
– Your changes are applied to the ARCADIS Orbic system.
– The configuration dialog remains open for further entries.

◆ Continue configuring the next operating mode on the corresponding tab card.

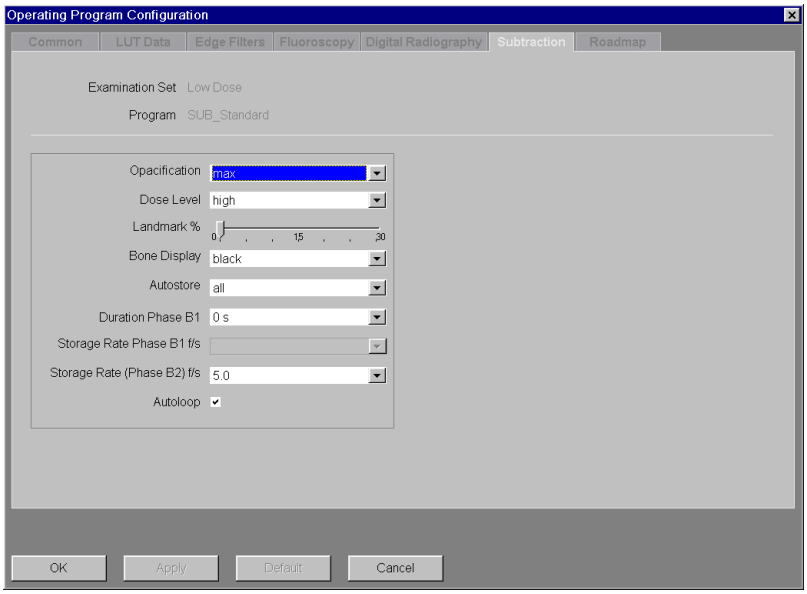
— Or —

OK

◆ Click this button.
– The dialog box is closed

The Subtraction tab card

This tab card is available only with the **Subtraction** option.



Parameter settings

You can change the following parameters on the tab card:

Parameters	Additional info
Opacification	Possible values: min, max
Dose Level	Possible values: medium, high
Landmark	With the slider: 0 to 30 %, in steps of 5 %
Bone Display	Possible values: white, black
Autostore	Off (no automatic storage) Phase B1, phase B2 (saves only images of the respective phase) All (all images are stored)
Duration Phase B1	Disabled if Autostore = 'off' otherwise enabled
Storage Rate Phase B1 f/s	Enabled if Autostore = 'all' and a duration phase B1 > 0 is set
Storage Rate (Phase B2) f/s	Enabled if Autostore = 'all'
Autoloop	Checkbox for activating automatic playback of a sequence of images at the end of the exposure

Changing parameters

◆ Select the required new parameters from the selection lists.

◆ Click this button.
– Your changes are applied to the ARCADIS Orbic system.
– The configuration dialog remains open for further entries.

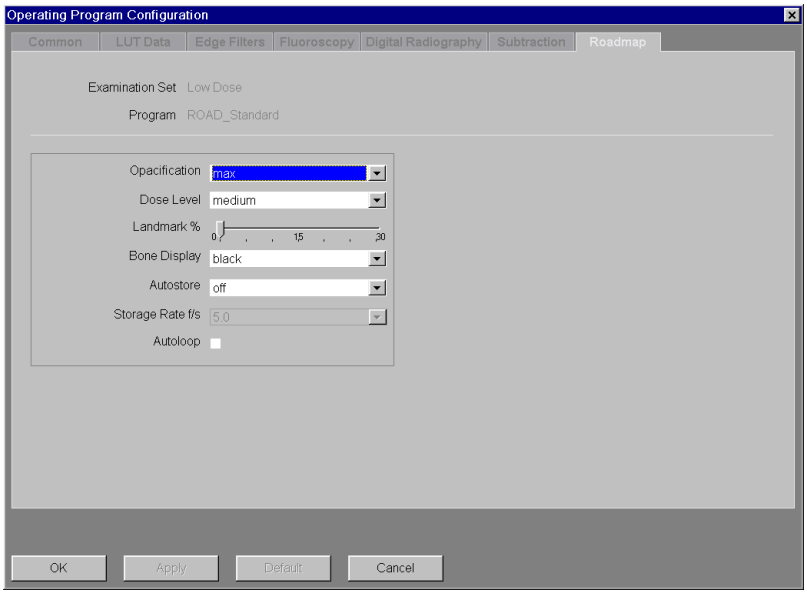
◆ Continue configuring the next operating mode on the corresponding tab card.

— Or —

◆ Click this button.
– The dialog box is closed.

The Roadmap tab card

This tab card is available only with the **Subtraction** option.



Parameter settings

You can change the following parameters on the tab card:

Parameters	Additional info
Opacification	Possible values: min, max
Dose Level	Possible values: medium, high
Landmark	With the slider: 0 to 30 %, in steps of 5 %
Bone Display	Possible values: white, black
Autostore	Off (no automatic storage) All (all images are stored)
Storage Rate f/s	Only if Autostore = all Setting in frames/s
Autoloop	Checkbox for activating automatic playback of a sequence of images at the end of the exposure

Changing parameters

◆ Select the required new parameters from the selection lists.

◆ Click this button.
– Your changes are applied to the ARCADIS Orbic system.
– The configuration dialog remains open for further entries.

◆ Continue configuring the next operating mode on the corresponding tab card.

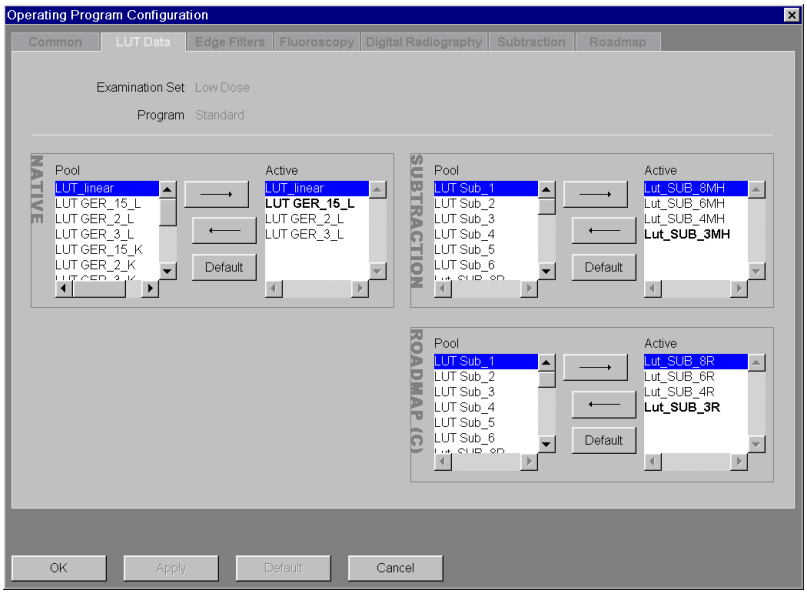
— Or —

◆ Click this button.
– The dialog box is closed.

The LUT Data tab card

The specified lookup tables (LUTs) are valid for those operating modes of the current examination set that generate/display native images.

If the SUB/Roadmap option is enabled, additional LUTs (lookup tables) can be selected for those operating modes of the current examination set that generate/display subtracted images.



Up to 4 LUT values can be activated. You can switch between them using the LUT keys for monitor A and monitor B on the C-arm system.

Activating LUTs (lookup tables)

◆ In the left column (LUT pool), select the LUT that you want to activate.

◆ Click this button.
– The LUT is moved into the column of active LUTs and is thus available via the respective keys.

Deactivating LUTs

◆ Select the LUT that you want to deactivate in the right column (LUT pool).

◆ Click this button.
– The LUT is moved to the LUT pool. Thus it is inactive.

Defining the LUT default settings

The first LUT value in the Active list is set as default. Use the Default buttons to define a different LUT value as default value.

- Select the value you want as default in the right column (active LUTs).

- Click this button.
  – The default LUT value is displayed in bold in the list.

Saving parameters

- Click this button.
  – Your changes are applied to the ARCADIS Orbic system.
  – The configuration dialog remains open for further entries.
- Continue configuring the next operating mode on the corresponding tab card.

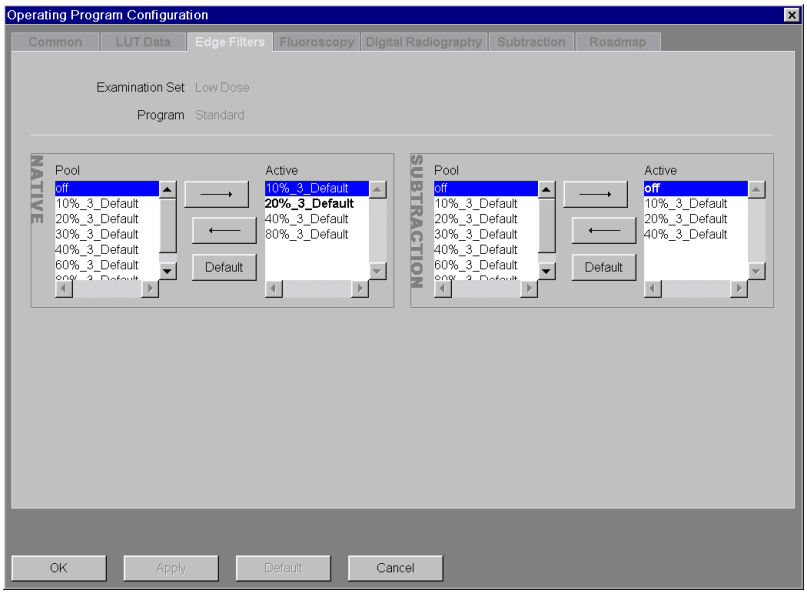
— Or —

- Click this button.
  – The dialog box is closed.

The Edge Filter tab card

The edge enhancement values displayed are valid for those operating modes of the current examination set that generate/display native images.

If the SUB/Roadmap option is enabled, additional edge enhancement values can be selected for those operating modes of the current examination set that generate/display subtracted images.



Parameter settings

The entries in the lists of available or active edge enhancement values are defined as follows:

Entry	Additional info
off	without edge enhancement
mm%_n_Default	mm: Edge enhancement in percent n: Kernel type

Up to 4 edge enhancement values can be activated (including "off"). You can switch between them using the edge enhancement key on the C-arm system.

Activating edge enhancement values

- Select the value that you want to activate in the left column (edge enhancement pool).

- Click this button.
  – The edge enhancement value is moved into the column of active values and is thus available via the respective key.

Deactivating edge enhancement values

- Select the value that you want to deactivate in the right column (active edge enhancement value).

- Click this button.
  – The edge enhancement value is moved to the edge enhancement pool. Thus it is inactive.

Saving parameters

- Click this button.
  – Your changes are applied to the ARCADIS Orbic system.
  – The dialog box is closed.

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Operator Manual
ARCADIS Orbic

Technical Description

SP

SPR2-320.620.01.02.02

Please observe the

Safety register

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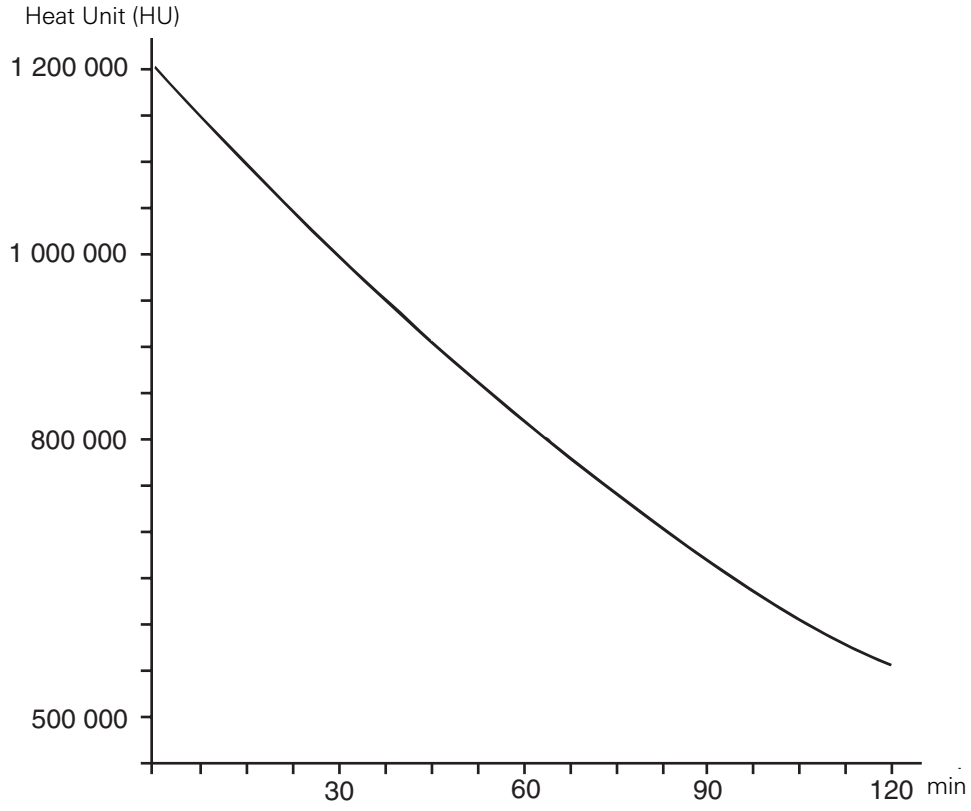
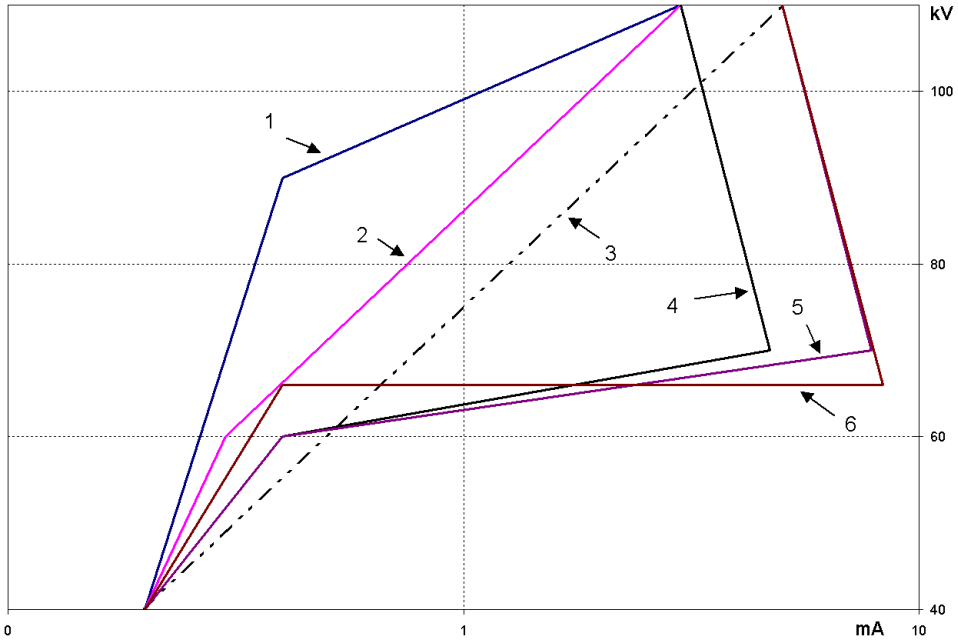
SIREPHOS 2000

Tube cooling curve



SIREMATIC curves

kV/mA curves for Fluoroscopy and Pulsed Fluoroscopy (0.5 to 2 frames/s)



(1) LD 330 W
SIREMATIC LD *Low Dose*
Standard mode max. 3.0 mA
in Power mode 600 W max. 5.5 mA

(2) S1 330 W
SIREMATIC S *Standard*
Standard mode max. 3.0 mA
in Power mode 600 W max. 5.5 mA

(3) S2 550 W
SIREMATIC S *Standard*
Standard mode max. 5.0 mA
in Power mode 1000 W max. 9.1 mA

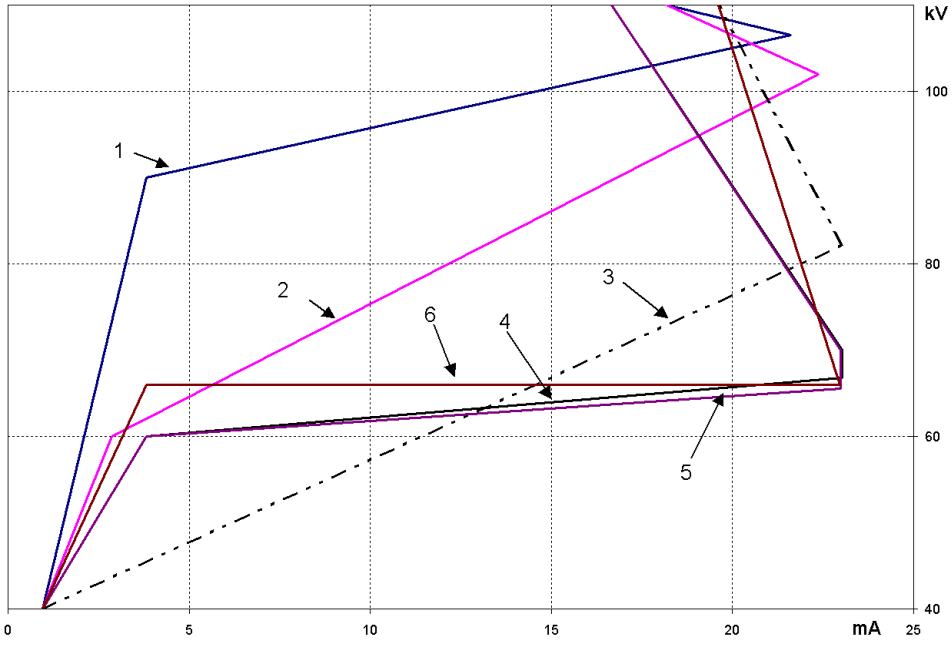
(4) HC1 330 W
SIREMATIC HC *High Contrast*
Standard mode max. 4.7 mA
in Power mode 600 W max. 8.6 mA

(5) HC2 550 W
SIREMATIC HC *High Contrast*
Standard mode max. 7.9 mA
in Power mode 1000 W max. 14.3 mA

(6) IOD 550 W
SIREMATIC IOD *Iodine contrast optimized*
Standard mode max. 8.3 mA
in Power mode 1000 W max. 15.2 mA

SIREMATIC curves	**Fluoroscopy/Pulsed Fluoroscopy**
S-1	Antiisowatt curve with max. 3 mA
S-2	Antiisowatt curve with max. 5 mA
LD	Low dose curve with high kV values: i.e. low radiation exposure for the patient, especially well-suited for pediatrics The characteristically high kV values result in lower image contrast
HC-1	High-contrast curve with max. 4.7 mA
HC-2	High-contrast curve for applications requiring higher mA values (max. 7.9 mA) e.g. spinal column, hip, skull
IOD	IODINE curve For special applications using iodine contrast agent

kV/mA curves for Pulsed Fluoroscopy (> 2 frames/s)



(1) LD 330 W
SIREMATIC LD *Low Dose*
Standard mode max. 21.6 mA
in Power mode 600 W max. 22.8 mA

(2) S1 330 W
SIREMATIC S *Standard*
Standard mode max. 22.4 mA
in Power mode 600 W max. 23.0 mA

(3) S2 550 W
SIREMATIC S *Standard*
Standard mode max. 23.0 mA
in Power mode 1000 W max. 23.0 mA

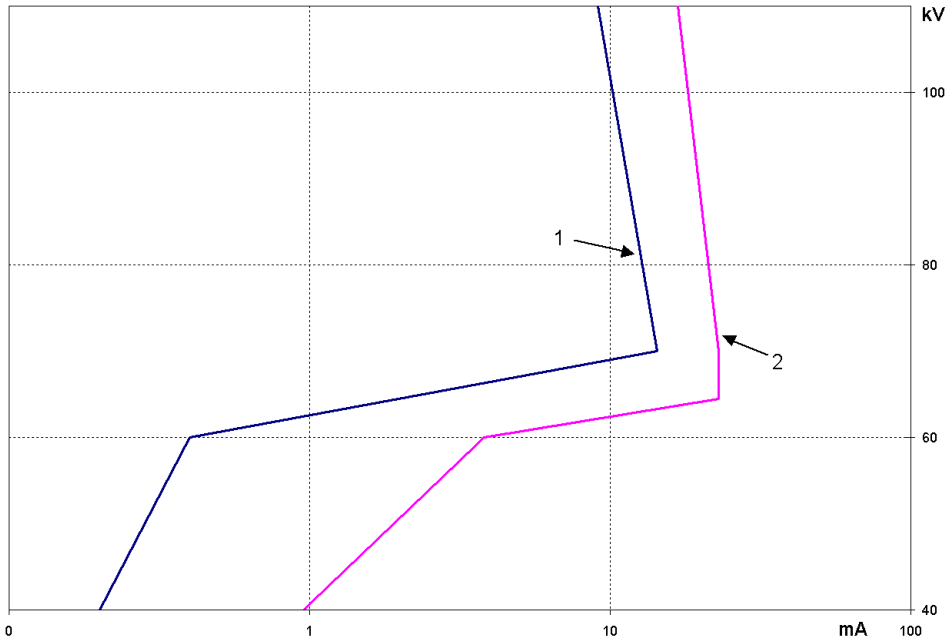
(4) HC1 330 W
SIREMATIC HC *High Contrast*
Standard mode max. 23.0 mA
in Power mode 600 W max. 23.0 mA

(5) HC2 550 W
SIREMATIC HC *High Contrast*
Standard mode max. 23.0 mA
in Power mode 1000 W max. 23.0 mA

(6) IOD 550 W
SIREMATIC IOD *Iodine contrast optimized*
Standard mode max. 23.0 mA
in Power mode 1000 W max. 23.0 mA

kV/mA curves for Digital Radiography (DR)

Dose rate at the image intensifier input



(1) DR 1000 W (3D option)
N > 1: with noise reduction factor
max. 14.3 mA

(2) DR 1000 W
N = 1: without noise reduction factor
max. 23.0 mA

The dose rate is factory-set between 0.11 µGy/s and 0.44 µGy/s depending on the I.I. format, measured behind the scattered radiation grid at the I.I. input.

Using a test phantom, the dose rate was set in a kV range between 70 kV and 80 kV.

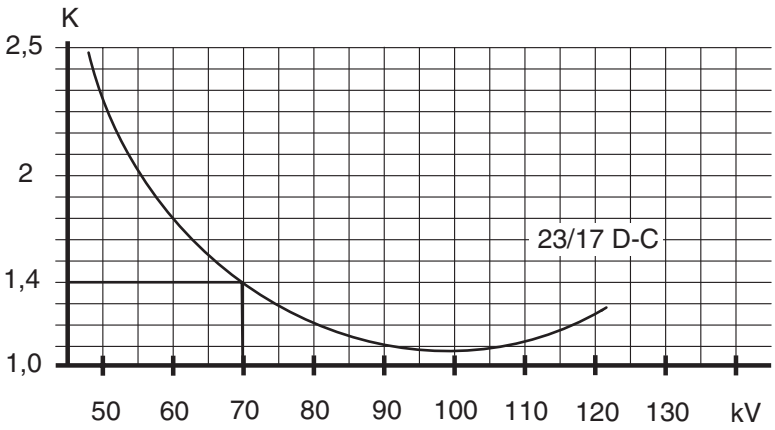
Deviation of the dose rate value from the values set at the I.I. input

Depending on the object being examined (kV, mA), different fluoroscopic data result. The sensitivity of the image intensifier is influenced by beam quality (kV). As a consequence, different dose rates may result at the I.I. input screen for the same luminance at the I.I. output screen.

When examining a patient in fluoroscopy mode, additional scatter radiation values are produced in comparison to the phantom values, affecting the dose rate value at the image intensifier input.

Deviation calculation

Using K as a correction value, (refer to diagram), the approximate deviation value from the set dose rate can be calculated.



Calculation example: With 70 kV the correction value is 1.4. That is, if the set dose rate value is 0.22 μGy/s, the actual value is approx. 0.22 μGy/s x 1.4 = 0.308 μGy/s.

Setting the dose rate value

If desired, the preferential position for the dose rate can be reprogrammed.

Complete system

General data	
Power requirements	100 V, 110 V, 120 V, 127 V, 200 V, 230 V, 240 V ± 10 %; 50/60 Hz ± 1 Hz
Nominal rating	20 A to 127 V~, 15 A from 200 V~ corresponds to the rated value of the slow-blow fuse in the mains input of the product
Internal line resistance	Ri < 0.3 ohms at 100 - 127 V~ Ri < 0.8 ohms at 200 - 240 V~
Power consumption	max. 2.5 kVA
Weight	C-arm system approx. 348 kg Monitor trolley with 2 monitors, approx. 190 kg (with PC and UPS)
Environmental conditions for operation	Temperature range: +15 °C to +35 °C Rel. humidity: 15 % to 75 %, non-condensing Barometric pressure: 700 hPa to 1060 hPa
Environmental conditions for transport	Temperature range: -20 °C to +37 °C Rel. humidity: 10 % to 95 %, non-condensing Barometric pressure: 700 hPa to 1060 hPa

Classification	
Protection against electrical shock	Class 1, no applied part acc. to IEC 60601-1
Protection against ingress of fluids	IPXO (not protected) acc. to IEC 60529
Operating mode	Continuous operation

Current/voltage values

Voltage	Long-term current consumption	Short-term current consumption
100 V	17 A	28 A
110 V	16 A	26 A
120 V	15 A	24 A
127 V	14 A	22 A
200 V	9 A	14 A
230 V	8 A	12 A
240 V	8 A	12 A

Generation of radiation

Generator	
Pulsed Fluoroscopy	Min. pulse width 7 ms
	Pulse rate 15 f/s/23 mA
	Max. pulse power 2.3 kW
Fluoroscopy	40 kV to 110 kV/0.2 to 15.2 mA (max. 1000 W)
Digital Radiography	40 kV to 110 kV/0.2 to 23 mA (max. 1000 W)
Current-time-reference product	1.6 mAs/102 kV
Tolerances	kV ± 10 % (measured with spectrometric kV method)
	mA ± 8 % ± 0.1 mA (measured in rectified high-voltage circuit)
	Fluoroscopic time 1 digit (6 s) ± 5 %
Power rating	1.4 kW (102 kV/1.6 mAs)
	Min. pulse width 7 ms
	Max. pulse power 2.3 kW
Exposure times	min. 50 ms at 40 kV 20 mA
	max. 10 s

X-ray tube unit	
SIREPHOS single-tank high-frequency generator	Inverter frequency 15 kHz up to 26 kHz
Inherent filtration	≥ 3 mm Al equivalent
X-ray tube	Stationary anode, focal spot nominal value 0.6

System components

C-arm	
C-arm orbital movement	190° ± 95°
C-arm angulation	± 190°
C-arm horizontal movement	20 cm
C-arm immersion depth	73 cm
C-arm swivel range	± 10°
C-arm vertical movement	40 cm, motorized
Source-I.I. distance	98 cm
Tube-I.I. distance	78 cm

Image intensifier	
Sirecon 23-2int. 1k	Nominal diameter 23 cm (9")
Format switch-over	23 cm/15 cm (9"/6")

Scattered radiation grid at I.I. input	
Round grid	Pb 8/40, f_o90; 17/70 f_o100
System attenuation factor	m = 1.5

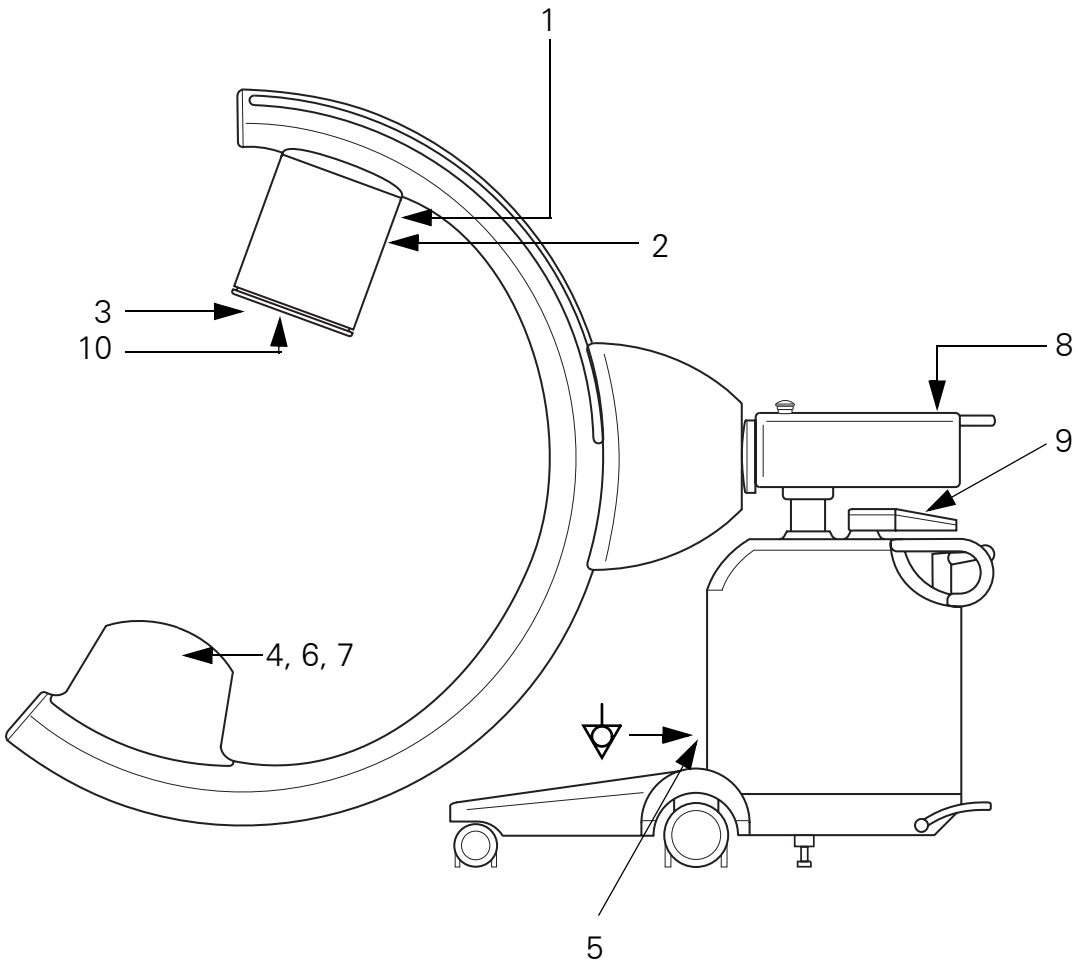
Collimator system	
Collimator system	Iris diaphragm for concentric collimation and semi-transparent slot diaphragm for collimation with unlimited rotation

Imaging chain	
Camera with CCD Sensor	1024 (H) x 1024 (V)
Aspia imaging system	Features, e.g. digital image rotation 360°
Monitors	
18" TFT color display	Resolution 1280 x 1024 (pixels)
Screen diagonal	46 cm (18")
18" TFT monochrome display	Resolution 1280 x 1024 (pixels)
Screen diagonal	46 cm (18")
19" TFT color display	Resolution 1280 x 1024 (pixels)
Screen diagonal	48 cm (19")

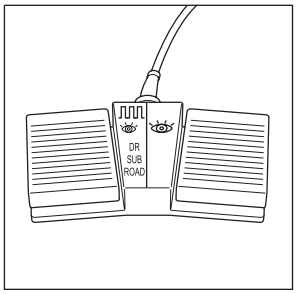
Informational signs

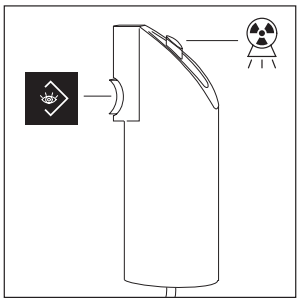
C-arm system

The labels shown below are permanently affixed to the following components.



Read operator manual





(1) I.I. housing

(2) Image intensifier

(3) Grid

(4) SIREPHOS X-ray tube housing

(5) X-ray system (control); system identification label

(6) Tube shutter

(7) Single-tank laser targeting device (optional)

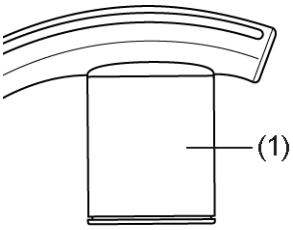
(8) Support arm

(9) Control console

(10) System-integrated I.I. laser aimer

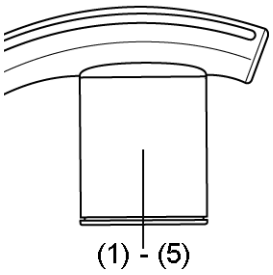
Equipotential bonding

(1) I.I. housing

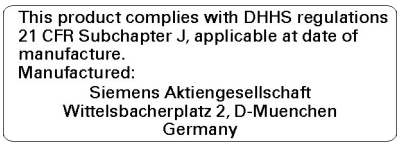


(1) Manufacturer's identification label

(2) Image intensifier



(1) Manufacturer's identification label


This product complies with DHHS regulations 21 CFR Subchapter J, applicable at date of manufacture.
Manufactured:
Siemens Aktiengesellschaft
Wittelsbacherplatz 2, D-Muenchen
Germany

(2) Approval label

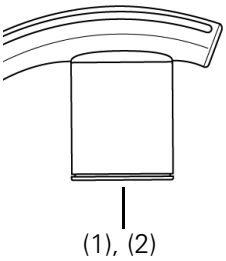
(3) Approval label

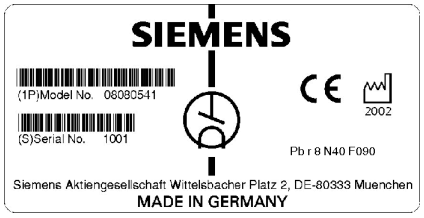
Medical electrical Equipment.
CLASSIFIED
C UL US
With Respect to Electrical Shock, Fire and Mechanical Hazards only in Accordance with UL 2601-1
245B

(4) Approval label

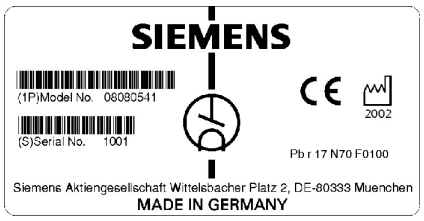
(5) Label for I.I. tube

(3) I.I. grid



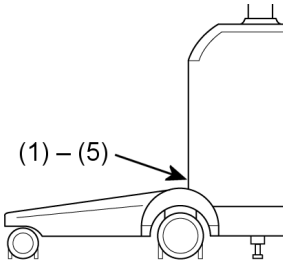


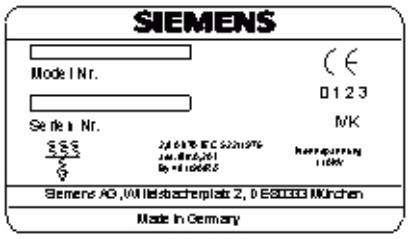
(1) GRID label



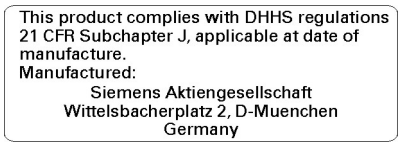
(2) GRID label

(4) SIREPHOS X-ray tube housing

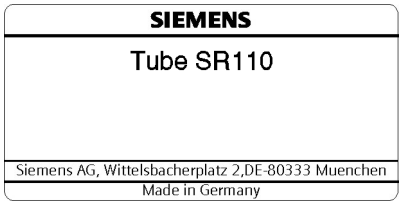




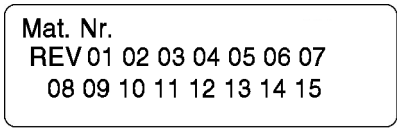
(1) Special label with beam entry



(2) Approval label



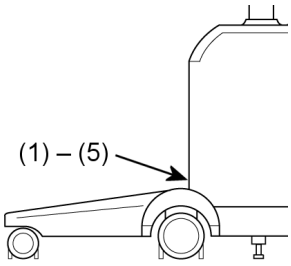
(3) Tube ID label



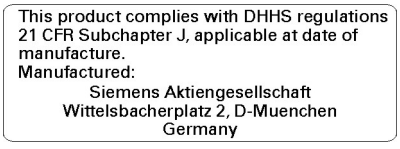
(4) Revision level label

(5) Supplementary label

(5) X-ray system (control)



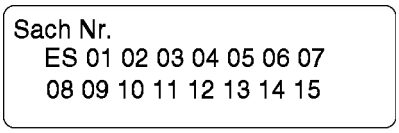
(1) System identification:
Manufacturer's identification label


This product complies with DHHS regulations 21 CFR Subchapter J, applicable at date of manufacture.
Manufactured:
Siemens Aktiengesellschaft
Wittelsbacherplatz 2, D-Muenchen
Germany

(2) Approval label

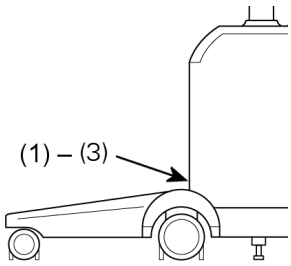
(3) Approval label

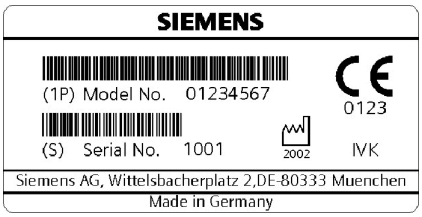
(4) Approval label



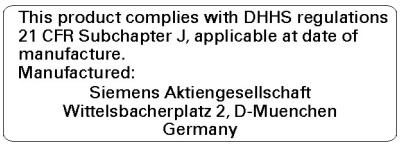
(5) Revision level label

(6) Tube shutter





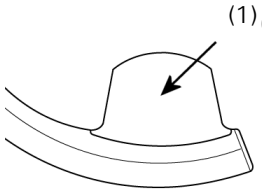
(1) Manufacturer's identification label



(2) Approval label

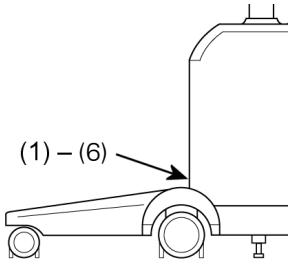
(3) Supplementary label

(7) Single-tank laser targeting device (option)



LASER APERTURE

(1) Warning label for USA/Canada/Great Britain



SIEMENS
(1P) Model No. 01234567
(S) Serial No. 1001
0123
2002
IVK
Siemens AG, Wittelsbacherplatz 2,DE-80333 Muenchen
Made in Germany

(1) Manufacturer's identification label

SECOND SET OF LABELS
LASER

(2) Supplementary label

This product complies with DHHS regulations 21 CFR Subchapter J, applicable at date of manufacture.
Manufactured:
Siemens Aktiengesellschaft
Wittelsbacherplatz 2, D-Muenchen
Germany

(3) Approval label for USA/Canada

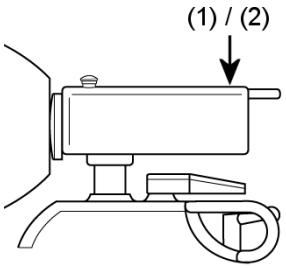
CAUTION
LASER RADIATION
DO NOT STARE
INTO BEAM
PEAK POWER < 1mW
WAVE LENGTH 540 - 700nm
CLASS II LASER PRODUCT

(4) Warning label for USA/Canada

(5) Warning label for countries other than USA/Canada

(6) Warning label for countries other than USA/Canada

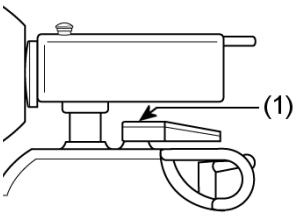
(8) Support arm



(1) Warning label for Canada only

(2) Affixed for Germany/Austria only

(9) Control console

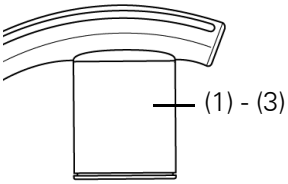


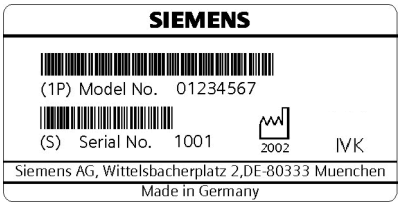
WARNING:

THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT AND OPERATOR UNLESS SAFE EXPOSURE FACTORS AND OPERATING INSTRUCTIONS ARE OBSERVED.

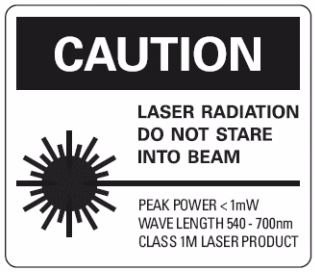
(1) For Canada and USA only

(10) System-integrated I.I. laser aimer





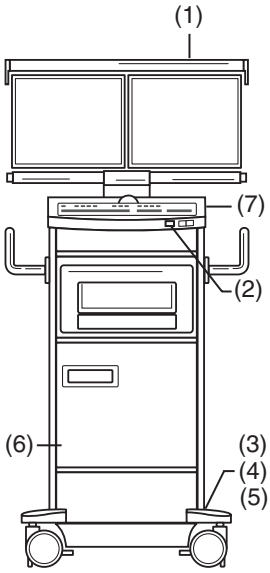
(1) Manufacturer's identification label



(2) Warning label for USA/Canada

(3) Warning label for USA/Canada/Great Britain

Trolley with TFT monitors



Made in Germany

(1) Manufacturer's identification label (Monitor)

WARNING:
THIS X-RAY UNIT MAY BE DANGEROUSTO PATIENT AND OPERATOR UNLESS SAFE EXPO-SURE FACTORS AND OPERATING INSTRUCTIONS ARE OBSERVED:

– Or –

WARNING!
THIS X-RAY UNIT MAY BE DANGEROUS TO PATIENT AND OPERATOR UNLESS SAFE EXPO-SURE FACTORS, AND OPERATING INSTRUCTIONS AND MAINTENANCE SCHEDULES ARE OBSERVED.

(2) Warning label for USA/Canada

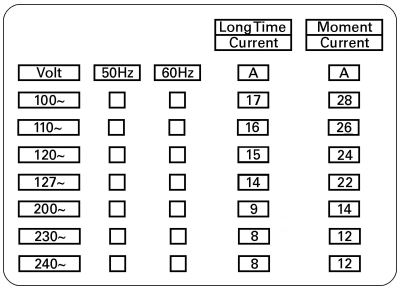
SIEMENS
(1P) Model No. 01234567
(S) Serial No. 1001
Siemens AG, Wittelsbacherplatz 2,DE-80333 Muenchen
Made in Germany

(3) Manufacturer's identification label (Trolley)

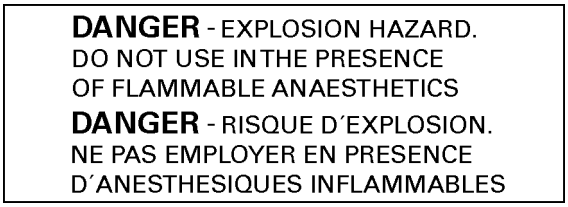
162597

(4) Approval label

(5) Approval label

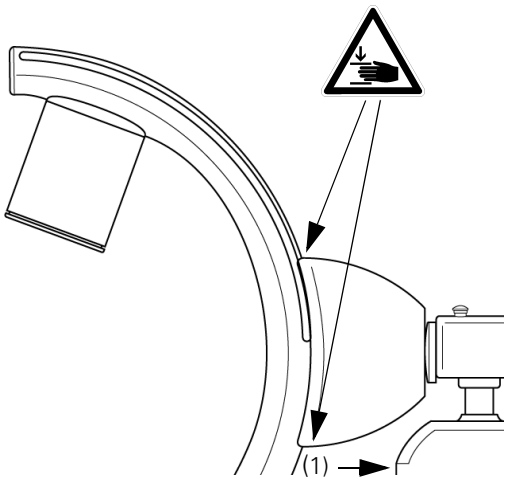


(6) Optional label country-specific connection data


DANGER - EXPLOSION HAZARD.
DO NOT USE IN THE PRESENCE
OF FLAMMABLE ANAESTHETICS
DANGER - RISQUE D´EXPLOSION.
NE PAS EMPLOYER EN PRESENCE
D´ANESTHESIQUES INFLAMMABLES

(7) Explosion hazard label for USA and Canada

Labels for 3D option



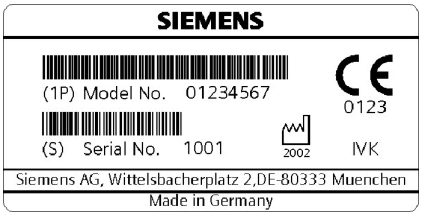
Warning label

Warning

For the duration of the scan, orbital movement of the C-arm is motorized.

Crushing hazard.

- Maintain a sufficient safety distance.



(1) Manufacturer's identification label

SIEMENS

Operator Manual
ARCADIS Orbic

Maintenance

SP

SPR2-320.620.01.02.02

Please observe the

Safety register

This must be studied thoroughly before system startup.

The original version of this manual was written in the German language.

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SP

Siemens AG, Wittelsbacher Platz 2, D-80333 München, Germany
Contact information: Siemens AG, Medical Solutions, Special Systems
Henkestraße 127, D-91052 Erlangen, Germany

Order no.: SPR2-320.620.01.02.02
Printed in Germany
AG 02/06

Operator Manual
Maintenance

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Functional and safety checks

To ensure that the ARCADIS Orbic is ready for operation and all safety features are functioning properly, you must perform regular functional and safety checks.

Daily checks

Prior to the examination

- Check the power plug. If the power plug is damaged, the ARCADIS Orbic must not be used.
- Check the power cable. If the power cable is damaged, the ARCADIS Orbic must not be used.
- Check the function of the foot brakes of the C-arm system and the monitor trolley as well as the steering of the C-arm system.
- Check the C-arm counterbalance after releasing the brakes.
- Check the function of all radiation indicators.
- Inspect the housing of the I.I. and the single tank for mechanical damage.

Checks prior to special examinations (e.g. of the open heart and skull)

- Make sure that there is an additional conductive connection between the C-arm system and a point of potential equalization, e.g. the patient table.

Monthly checks

Functional check of the dose rate control function

This following simple procedure allows you to check the automatic dose rate control function without an object in the beam path. A kV value of ≤ 45 kV must be displayed:

- Open the iris and slot diaphragms to maximum aperture.
- Press the **Dose rate control Stop** (ADR Stop) key.
- Select 110 kV with the +/- keys.
- Press the **Dose rate control Stop** key again.
  – The stop function is canceled, automatic dose rate control is switched on again.
- Release radiation in the fluoroscopy mode.
  – The tube voltage is reduced to a value ≤ 45 kV.
  – The monitor image is not overexposed.

Checking the EMERGENCY STOP function for motor-driven system movements

- Switch the ARCADIS Orbic on.
- Move the lifting column and press the **EMERGENCY STOP** button at the same time.
  – The lifting movement is stopped.
  – A message is displayed on the monitor indicating that EMERGENCY STOP has been actuated.
- Unlock the **EMERGENCY STOP** button again.
- Press one of the keys for moving the lifting column.
  – The lifting movement is enabled again.

Maintenance plan for checking the system

The tests and inspections required by national laws or regulations, such as DHHS regulations or RöV (constancy tests), are not part of the activities listed in this maintenance plan.

If national laws or regulations specify more frequent checking and/or maintenance, this must be observed.

Maintenance work should be performed by trained technical personnel only. To keep the system in an optimum condition, we recommend that you conclude a maintenance contract. If you have any questions relating to maintenance/maintenance contract please contact our Siemens Customer Service.

Please observe the relevant information in the
(→ *Register Safety, Page 8).*

Checking the system

Procedures to be performed	**Function**	**Interval**
Mechanical safety	Damage to the housing, system movements and options (e.g. laser light localizer)	12 months
Electrical safety	Ground conductor, grounding strap on the C-arm system, cables and plugs	12 months
Functional check	Emergency stop and lifting column	12 months
Image quality	Image display and image processing	12 months
Calibration with 3D option	Display of 3D scans	6 months

The stated functions are minimum requirements.

For notes

Service support via network connection

Siemens Customer Service has the possibility of accessing the ARCADIS Orbic via an active network connection or a modem.

With full access, the image area of the left monitor is superimposed by a full screen message. When this message is displayed, radiation can still be released.

The ARCADIS Orbic should only be operated within a virus-protected hospital network.

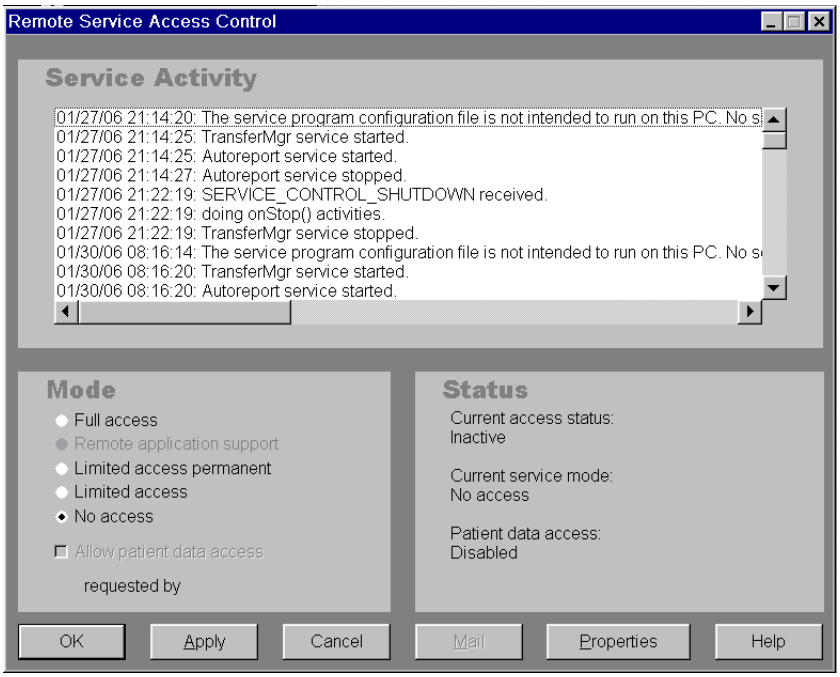
Remote service access

The **Remote Service Access Control** window allows you to grant Service personnel access rights so that they can perform maintenance.

If the Remote Service Access Control option is activated, remote service can only be performed from "trusted systems" (systems that have exchanged "proved certificates" with your syngo system).

Calling up Remote Service Access Control

- Select **Options > Service > Remote Service**.
  - The **Remote Service Access Control** window is displayed.



Limiting access rights

As long as you have assigned Service personnel full access rights (Full Access), i.e. as long as maintenance is being carried out, you cannot work with your ARCADIS Orbic system.

Warning

Aborting remote service without consultation with service engineers.

Aborting remote service cancels all service procedures and causes the ARCADIS Orbic to malfunction.

- Always consult with a service engineer before aborting remote service

- Select **Limited Access** or **No Access** and confirm with **OK** or **Apply** to continue working.

For further information, please contact Siemens Service or your system administrator.

Service access

In order to allow service activities, users with the relevant privilege must grant the service engineer access to the computer. The procedure differs for local and remote service access.

Remote access

Remote service access allows the service engineer to carry out maintenance activities from a remote workstation.

- ❏ **Full Access**
  Allows the service engineer to take control of your workstation (in which case your workstation will be disabled for you).
- ❏ **Limited Access**
  This mode provides access to all service functions that do not interfere with regular patient operations.
- ❏ **Access to Patient Data**
  The service engineer has no access to patient data from a remote system. If such access is needed, it must be explicitly requested from you.
- ❏ **Application remote support**
- ❏ **No access**

- ◆ Start a remote service session and wait for confirmation from the remote workstation.
- ◆ Depending on the required service activities, you will assign the service engineer full or limited access to your workstation.

Terminating a service session

If you end a remote service session while the service engineer is still working, all currently active service programs will be terminated. This may cause the ARCADIS Orbic to be inconsistent or inoperable.

The service engineer is only notified that the session is going to be ended by you.

- ◆ Check with the service engineer before you end the session.

Cleaning and disinfection

Before cleaning or disinfecting the ARCADIS Orbic, the system must be disconnected from the mains.

Cleaning

All parts that come into contact with patients must be cleaned prior to each examination.

Caution

Cleaning agents or fluids penetrating into the equipment.

This can cause danger or damage to the ARCADIS Orbic.

- Never spray the ARCADIS Orbic!

- Clean the parts with a damp cloth.
- For cleaning, use water or a lukewarm diluted solution of water and a commercially available cleaning agent.
- Do not use abrasive cleaning agents or organic solvents or solvent-based cleaning agents such as benzine, alcohol, spot removers, etc., due to potential material incompatibility.

Disinfection

For the disinfection of surfaces we recommend liquid solutions of common surface disinfectants based on aldehyde and/or amphoteric surfactants, e.g. Tensodur 103, Korsolin, Cidex.

Substituted phenol-based or chlorine-releasing disinfectants can weaken materials and are therefore not recommended. The same restrictions apply to undiluted solutions with a high alcohol content, e.g. for disinfecting hands.

Caution

The spray mist of disinfectant sprays may penetrate into the equipment.

Sprays can cause damage to electronic components or the formation of flammable mixtures of air/vapor.

- Disinfectant sprays should generally not be used!

- Please follow the instructions for use of the disinfectant.

As is commonly known, some substances in disinfectants are hazardous to health. Their concentration in the air must not exceed the legally defined limit. We recommend that you follow the manufacturer's instructions for the use of these products.

Monitor trolley

Screen surfaces/TFT displays

Monitors should be cleaned at least every two months.

Caution

Acids or alkaline solutions on the monitor screen.

This may damage the monitor screen.

- Monitors with anti-glare, non-reflective surfaces should only be cleaned with a soft cloth.

- Clean the monitor screen with a cotton cloth dampened with water.
- Remove stubborn stains with a mixture of 2/3 water and 1/3 alcohol.
- Immediately dry off the monitor screen with a soft cotton cloth.
- Wipe off any contrast agent spots as quickly as possible.

For notes

SIEMENS

Operator Manual
ARCADIS Orbic

Accessories

SP

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Operator Manual
Accessories

Chapter: Accessories

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Clamps to keep covers in place 5

Grounding cable 5

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Accessories

Anyone who connects additional equipment to the medical device configures the system and is therefore responsible for ensuring that the system configuration in its current version complies with the relevant standards (e.g. system standard IEC/EN 60601-1-1 and/or other applicable standards). In the case of queries please contact your local contact person.

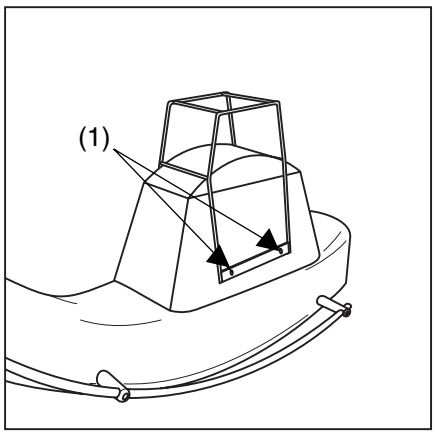
The following accessories have been approved for use with the ARCADIS Orbic:

Accessories	**Part Number**	**Manufacturer**
I.I. laser aimer	3099988	Z-Laser Optoelektronik GmbH
Grounding cable	2171767	Nicolay Services GmbH
DHHS cap	5643502	MED CO IDB
Disposable cover	5146886	Heisig GmbH
Fabric cover	2829096	Karl Dieckhoff GmbH
Set of clamps	5646307	NPW Schubert GmbH & Co.KG
Disposable cover ARCADIS Orbic cpl. (16 pcs.)	8081288	Microtek Medical B.V., NL
Disposable cover ARCADIS Orbic I.I. (32 pcs.)	8081296	Microtek Medical B.V., NL
NaviVision 2D	14404713	BrainLAB AG, D-Heimstetten
NaviVision 3D	14404714	BrainLAB AG, D-Heimstetten

Spacer

The distance between the source and tube assembly cover (shortest possible source-skin distance) is ≥ 200 mm with the standard system (acc. to IEC 601-1-3).

Country-specific regulations may require a larger source-skin distance (≥ 300 mm acc. to DHHS 21CFR). This is achieved by attaching an additional spacer to the C-arm system.



(1) Knurled screws

- If this source-skin distance is too large for special examinations, the spacer can be removed by taking off the knurled screws.
  - The spacer must be reattached after this type of examination to ensure the reduction in skin dose resulting from a greater source-skin distance.

Clamps to keep covers in place

The clamps keep the sterile C-arm cover in place.

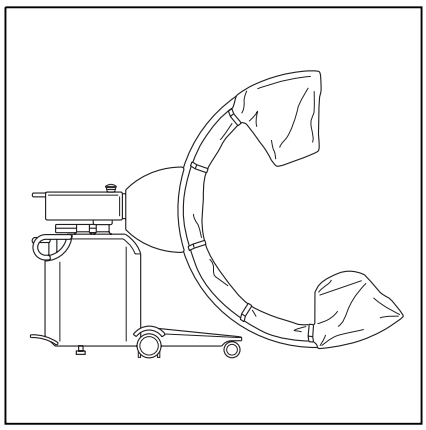
They can be sterilized.

Please make sure that the clamps are properly fastened. Otherwise there is a danger of injury.

Grounding cable

An optional grounding cable is available for equipotential bonding in accordance with DIN 57107/VDE 0107 for rooms of Application Group 2E (cardiac catheterization).

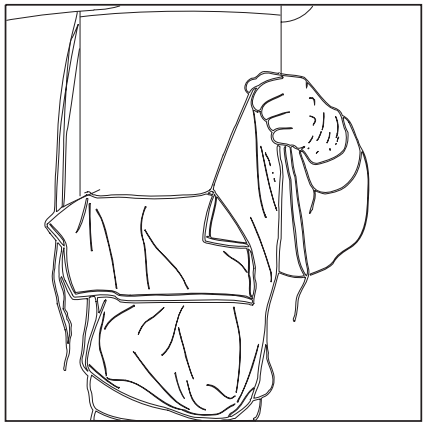
Sterile cover for the C-arm



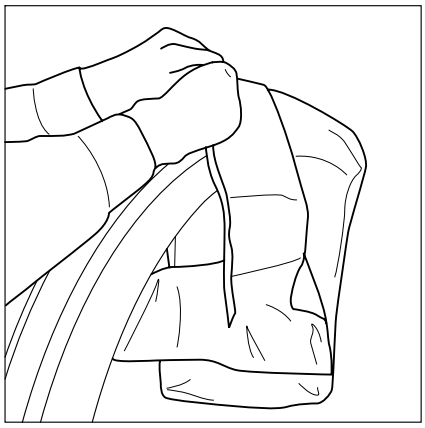
C-arm completely covered

The C-arm including the image intensifier and the X-ray tube can be covered with a two-part sterilizable cover.

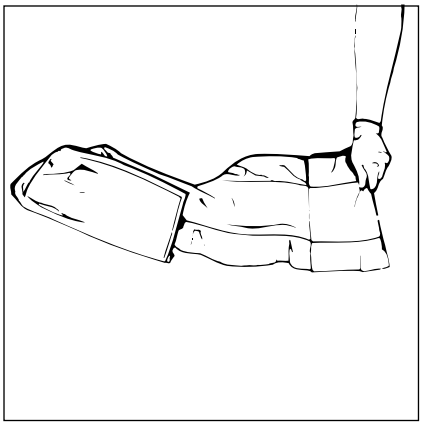
The cover is attached with sterilizable clamps.



◆ Slip the cover over the image intensifier.

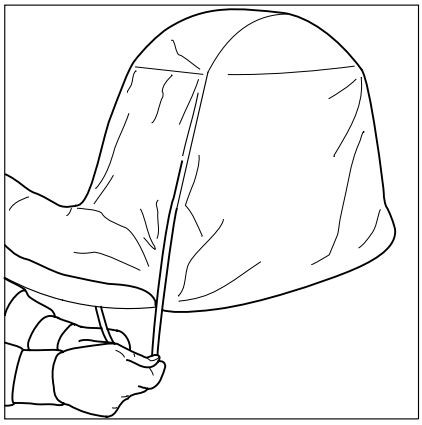


◆ Attach the image intensifier cover.

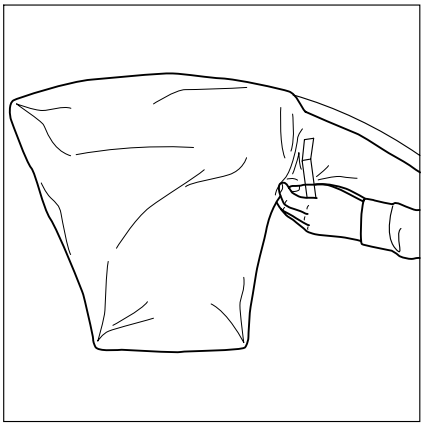


◆ Fold the cover for the C-arm and the X-ray tube.
  – To cover the equipment, fold the cover as shown before slipping it over the components. Thus slipping the cover over becomes easier and it is ensured that the outside of the cover does not come into contact with the C-arm.

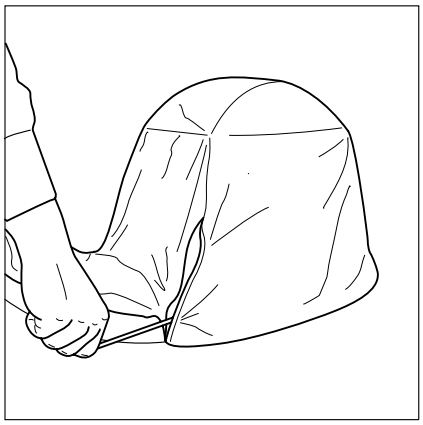
◆ Slip the cover over the X-ray tube and cover the C-arm.



◆ Attach the cover close to the X-ray tube with clamps.



- Let the C-arm cover overlap the image intensifier cover and secure the C-arm cover with a clamp.



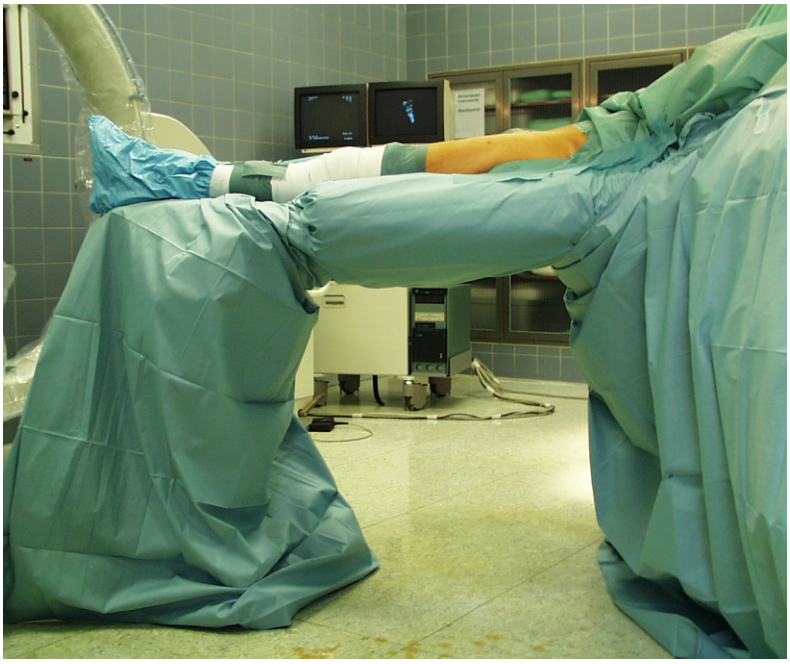
- Tie down the cover of the X-ray tube.

Sterile cover for 3D option

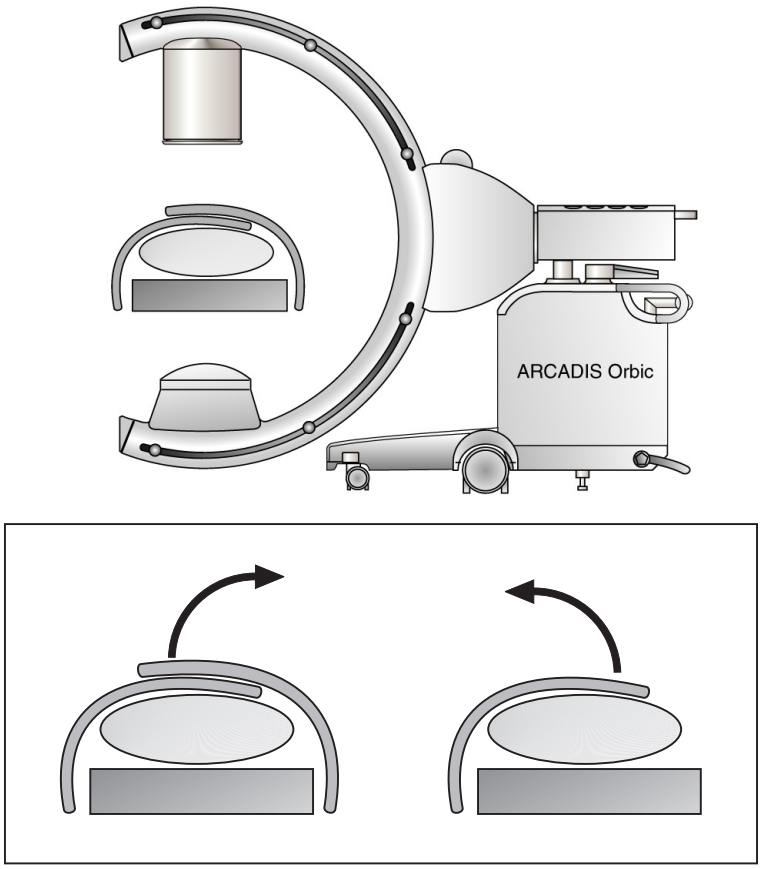
During the 190° orbital rotation for 3D data acquisition, part of the C-arm will travel from underneath the OR table to above the OR table. This requires special measures to maintain sterile conditions.

Surgeons are currently applying two different methods for this:

1. A **sterile tunnel** is created with sterile drapes (see picture). Only the floor remains unsterile. The C-arm, which is covered with a sterile drape, rotates through this sterile tunnel.



2. The patient is covered with two additional overlapping sterile drapes before the scan is started. After the scan, these two (possibly contaminated) drapes can be rolled down with sterile towel clips (see below).



Integrated I.I. laser aimer

To project the target crosshairs, two Class 1M lasers are used whose exit windows are arranged offset by 90° in the holding ring for the I.I. grid.

Warning

Laser radiation

Danger of eye injury!

◆ Do not view the beam using optical instruments (laser class 1M).

Laser specifications

❏ Laser class: 1M (IEC 60825-1:1993 + A1:1997 + A2:2001)

❏ Wave length: 635 nm

❏ Color: red

❏ Max. power: 0.8 mW (± 10 %)

Single-tank laser targeting device

Short-term exposure (looking into the laser beam for no longer than 0.25 s) to laser beams of class 2 is not hazardous to eye.

The aversion response and the blinking reflex will usually protect the eye.

In Germany, the operator is responsible for ensuring that the user has been instructed in the use of the laser. Outside Germany, the relevant laws and regulations regarding the use of Class 2 lasers must be complied with.

Warning

Laser radiation

Danger of eye injury!

◆ Do not look directly into the laser beam.

Laser specifications

- ❏ Laser class: Class 2 acc. to IEC 825
- ❏ Laser type: Semiconductor laser (laser diode)
- ❏ Wave length: 655 nm (visible red)
- ❏ Power output: < 1 mW